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ABSTRACT

This document contains transcripts of testimony and prepared testimony from 93 witnesses who testified at or submitted statements to a Congressional hearing on agricultural research, education, and extension programs. Witnesses included U.S. representatives, administrators of colleges of agriculture in universities, representatives of Farm Bureaus, and representatives of various groups in the agricultural industry. The hearings revolved around a broad range of issues concerning agriculture, with emphasis on the benefits it has produced and the need to continue it and fund it as well as possible. Witnesses also noted the benefits to youth of participation in agricultural youth groups and the need to update techniques, research methodology, and teaching methods to use resources more effectively. (KC)

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AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION PROGRAMS

HEARINGS

BEFORE THE

SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION, AND RESEARCH

OF THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTH CONGRESS

FIRST SESSION

JUNE 17, 18, AND
JULY 9, 22, 1997

Serial No. 105–20

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AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION PROGRAMS

TUESDAY, JUNE 17, 1997

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON FORESTRY, RESOURCE
CONSERVATION, AND RESEARCH,
COMMITTEE ON AGRICULTURE,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 1300, Longworth House Office Building, Hon. Larry Combest (chairman of the subcommittee) presiding.

Present: Representatives Smith, Everett, Lucas, Moran, Jenkins, Cooksey, Dooley of California, Brown, Stabenow, John, Peterson, Pomeroy, Berry, and Goode.

Staff present: John E. Hogan, chief counsel; John Goldberg, Russell Laird, Callista Bisek, Wanda Worsham, clerk, and Anne Simmons.

OPENING STATEMENT OF HON. LARRY COMBEST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. COMBEST. The hearing of the Subcommittee on Forestry, Resource Conservation, and Research to review the role of Federal, State, and private agricultural research shall come to order.

Good morning and welcome to all of our guests and witnesses who are here today.

I would first like to thank you very much for taking your time to share with us the thoughts and ideas that you have about what I think is one of the most important subjects in the field of agriculture.

Today is the first in a series of at least four hearings that we will have that are planned by this subcommittee to review agricultural research, education, and extension programs.

I've always felt that our cutting edge technology which is dependent on strong research and development efforts is what gives American agriculture the advantage over the rest of the world. While we have some of the most productive land in the world and very hardworking people who produce our food and fiber, we cannot and will not stay competitive on a world market without continued investments in agriculture research extension and in education.

I believe that all the components of our agricultural research portfolio do an excellent job and are something that we should be very proud of. I view agricultural research as the stabilizing roots of our agricultural system. It is the foundation of the system that has brought us to where we are today and the foundation to build on into the future.

Agricultural research has led to a six-fold increase in agricultural labor productivity since 1948. Almost 50 years ago, the number of people fed by one farmer was 15. Today, one farmer is able to feed 96 others. That being said, I also believe that periodic review of all government programs is necessary. Likewise, I believe we have a difficult, but very important job ahead of us as we approach this endeavor.

While there has been some review and incremental adjustments in research programs during the regular farm bill process over the last several years, it has been nearly 15 years since a comprehensive review of these programs was undertaken and 20 years since comprehensive legislation addressing agricultural research programs passed through the Congress.

Further, with passage of the 1996 farm bill came fundamental changes to Federal farm policy which will expose farmers to additional risk in the marketplace. In light of this substantial change in farm policy it is even more critical that strong support for research programs is maintained to insure that we can keep the competitive edge in the technology area. While this is our goal, the degree of difficulty involved is multiplied by our tight budget situation and numerous competing needs.

No matter what good intentions we may have in this committee, I will remind all of our witnesses and observers that this specific funding decision is made in the Appropriations Committee. With that framework in mind, I intend to explore any and all suggestions for improvements that can be made in our research efforts.

While I will continue to encourage our colleagues on the Appropriations Committee to consider the vital importance of investments in agricultural research, I think we need to focus the debate at hand on efforts to improve current research and accomplish more with the same or very possibly fewer dollars.

As I stated earlier, the subcommittee will hold at least four hearings in the coming weeks on this topic. Today's hearing should give us a good overall look at the profile of on-going research efforts by engaging the three main elements of the agricultural research structure Federal, State and private in a discussion about their current and future role.

Today's witnesses will represent the U.S. Department of Agriculture's in-house research conducted by the Agricultural Research Service, research conducted by our Nation's universities, research funded by farmer support and foundations and corporate and other foundations and a general view representing all stakeholders in agricultural research from the vice chairman of the USDA's advisory board.

Tomorrow morning's hearing is intended to give us a better understanding of how the different roles of research can best benefit from leveraging their investments through the formation of partnerships between the public and private sector. After the 4th of July recess, the subcommittee will reconvene and will look at models for coordination between the public and private sector in agricultural research and extension.

Finally, the subcommittee will convene to hear testimony from agricultural organizations regarding their specific recommendations for reauthorizing the research title of the 1996 farm bill.

Again, I would mention to our witnesses that we appreciate their very much time that you have taken to prepare your testimony and appear before this subcommittee and I'm sure I speak for other members of the subcommittee and look very forward to hearing from you in a few moments.

I would recognize at this time the gentleman from California, Mr. Dooley.

OPENING STATMENT OF HON. CALVIN M. DOOLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. DOOLEY of California. Thank you, Mr. Chairman.

I want to thank you for holding this the first what will be at least four hearings as we delve into the research issues. I also would like to take just a moment to also welcome my brother Dan who will be testifying on behalf of the USDA Advisory Board. Besides being my brother, he's also my partner in our farming operation in the San Joaquin Valley in California.

I think what our overall objective here is pretty clear. How do we maximize the investment of Federal dollars in research? How do we, by that investment, maximize the support that we receive from State and local, both public and private sources in order that we again maximize and leverage to the greatest extent possible the investment in research.

The paramount need for this, I think, is very clear, and so we are moving into an era where the government is going to be playing less and less of a role in providing income support. We have to provide farmers in our agricultural industry the tools in which they can be competitive in the international marketplace and certainly by this, our Government's participation in facilitating that we're going to be on the leading edge of technology, we can best insure that we are going to be among the low cost competitors that have the ability or provide the ability for our U.S. farmers to capture some of these emerging markets.

What I'd also ask in the conversations and the discussion that we have today is that we at times maybe take I guess the opportunity to look a little bit outside the box. Sometimes I think we find ourselves bound by some of the historic and institutional systems that we have in place and I guess I'd be most interested in hearing if we were going to start from ground zero, would we create the system and the structure that we have in place currently or would we devise something different?

Would we have the same type of formula funds and allocations or will we have changes in that in order to insure that this investment of Federal dollars is going to be used most effectively.

I look forward to hearing your comments on those issues and many others and hopefully when the dust settles on this issue we can insure that we'll have a reauthorization of a research title which is going to provide the means for our agricultural industry and our rural communities to be able to meet the challenges of international marketplaces as well as some of the real developing needs of their local communities.

Mr. COMBEST. I thank the gentleman. I understand that Dooley Farms is doing much better since you've taken over more full time management.

I would recognize Mr. Smith for any comments.

OPENING STATEMENT OF HON. NICK SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. SMITH. Just briefly. It's interesting to see how many off-farm jobs it takes to run a farming operation.

As a member of the Budget Committee, I am sure that budgetary pressures are undoubtedly going to put pressure on the amount of Federal funds available to invest in agricultural research programs.

If we're going to improve the efficiency and effectiveness of how the Federal funds are spent, we have to look at defining the roles that states and agribusiness and farmers and ranchers themselves will play if we're going to maximize the efficiency and minimize any unnecessary duplication, so I think at a time when we are now putting a greater responsibility on farmers themselves to compete in a ever toughening international market, research has got to continue to be a priority in this and future Congresses.

Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Goode.

OPENING STATEMENT OF HON. VIRGIL H. GOODE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VIRGINIA

Mr. GOODE. I look forward, Mr. Chairman, to hearing what all have to say today. Living not too far from Virginia Tech which has benefitted from Federal and State funds in the area of agricultural research and seeing how much a few dollars in research have multiplied for the private sector and for our economy, I hope that this Congress can do all it can in the area of research.

Mr. COMBEST. I thank the gentleman. Mr. Everett.

OPENING STATEMENT OF HON. TERRY EVERETT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ALABAMA

Mr. EVERETT. Thank you, Mr. Chairman. I'd like to take a moment to welcome our guests and while I don't have a brother here, I do have a very close friend and constituent, Mr. Jimmy Sanford from Prattville. Jimmy is the immediate past president of the National Cotton Council and now serves as the chairman of the Cotton Council's Industry and Government Research Committee. He's been a great asset to the cotton industry and I'm happy to have him here with us today.

Mr. Sanford states in his testimony the public and private research systems have been generally responsive to the cotton industry's research needs. I agree with this statement and hope that it rings true for all other areas of the agricultural industry as well. He says that Bt cotton and boll weevil eradication program are two examples of the effectiveness of those research efforts and have proven extremely important to my district. I believe that research is what allows our farmers to be the best and most efficient in the world and it is imperative that both the Government and industry continue to support the corporate research effort.

I look forward to working with you, Mr. Chairman, and the rest of the committee at a time when we're all sort of between the proverbial rock and a hard spot. Our budget, on the one hand, in my estimation, the need for research dollars is perhaps because the change in agricultural industry has never been any greater.

So thank you for this time.

Mr. COMBEST. Thank you, Mr. Everett. Mr. Cooksey.

OPENING STATEMENT OF HON. JOHN COOKSEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. COOKSEY. Thank you, Mr. Chairman. I want to thank you for the opportunity to be here and incidentally, we've had a lot of forestry-related hearings recently, it seems like, and I thank all the panelists for being here this morning, for taking time to present your testimony.

Also, I want to specifically thank Mr. Sanford for being here and for participating in this. Their council has done a lot for research. As a physician, trained in the scientific method, I still have more confidence in the scientific method and research than I do the political method because I'm a freshman and I'm not quite convinced that the political method is always the best way to get the answers, but research is what finds cures for diseases. It's what finds solutions for cotton products, for corn products, for a lot of agriculture products. The scientific method still works and I'm glad you're here.

One of my sources of information in learning last year was a man who has contributed a great deal to agriculture and to research over the years, Chancellor Ross Caffrey and he told me that for every dollar that's spent on research, long term we gain $10 in benefits for that research. I believe that. I know that. I know that to be a fact. So research is very important. This is a very important return only in investment and primarily on the taxpayers' investment.

So for all of those who are representative of the agricultural industry and farming from my district from all the other 435 districts around the country, we're glad you're here. We appreciate your participation and there are some of us that are new to this political arena that do really believe in the scientific method. We're glad you're here. Thank you, Mr. Chairman.

Mr. COMBEST. Thank you, Mr. Cooksey.

Mr. Berry.

OPENING STATEMENT OF HON. MARION BERRY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARKANSAS

Mr. BERRY. Thank you, Mr. Chairman. Thank you for holding these hearings. I just want to add to what's been said, that as a farmer myself, I think the fact that the American farmer is the most incredible producer that's ever been known in the history of mankind is largely due to the research effort that's gone into American agriculture over the years and having been a recipient of that myself I certainly appreciate all the work that you have done and the things that agricultural research has meant to this country and to the world. I certainly appreciate you being here and look forward to supporting this effort very much and look forward to another couple of hundred years of great progress in the agriculture area.

Mr. COMBEST. Thank you, Mr. Berry.

If any other members have statements to submit, they may be included at this point in the record.

[The statements of Chairman Smith and Mr. Pickering follow:]

STATEMENT OF REPRESENTATIVE ROBERT F. "BOB" SMITH
Subcommittee on Forestry, Resource Conservation, and Research
June 17, 1997

Good morning. Thank you Mr. Chairman for holding this hearing today on the current and future role of the Federal, state, and private agricultural research interests.

I would first like to extend a personal welcome to my friend, Dr. Thayne Dutson, who is the Dean of the College of Agricultural Sciences and Director of the Oregon Agricultural Experiment Station at Oregon State University.

Mr. Chairman, I look forward to the four hearings that you intend to hold on the very important topic of agricultural research, education, and extension.

As anyone who has heard me speak over the last six months knows, one of my priorities for the Committee during the 105th Congress is the expansion of domestic and international markets for American agricultural commodities. I can think of no better way in which Congress can facilitate this goal than to establish policies which improve the methods in which research information is collected and disseminated to producers.

The current agricultural research, education and extension system which has been in place for more than 130 years has been fundamental to making the American supply of food and fiber the safest, most abundant, most diverse and most affordable in the world.

I believe we are all aware of the current budgetary constraints and the potential impact this may have on these vital programs. I am personally committed to fighting to maintain adequate funds for these programs. At the same time, we must not lose sight of the opportunity that we have in the coming months for improving the efficiency and effectiveness in which agricultural research programs are administered.

With that Mr. Chairman, I thank you again for holding these hearings and I look forward to working with all Members in crafting a Federal agricultural research policy that will enable our nations farmers and ranchers to compete successfully in the world marketplace.

The Role of Federal, State, and Private Research
Material Submitted for the Record
Chip Pickering (R-MS)
Subcommittee on Forestry, Resource Conservation, and Research
June 17, 1997

Opening Statement

Thank you, Mr. Chairman for holding this hearing on agricultural research. Through the years, research in agriculture has been important to the success of America's farmers and ranchers. However, with decreased government intervention and the phase-out of many farm programs, agricultural research has become essential in order for our producers to remain competitive on the world market. In other words, while there is no doubt that our nation's farmers are the most efficient in the world, the simply fact is that we have to be in order to compete on a world market which includes many countries that heavily subsidize their producers.

I am concerned about agricultural research not only because of the many farmers and ranchers that make their living in my rural district in Mississippi, but also because Mississippi State University, a land grant institution is also in my district. In Mississippi, research is perceived in a positive way by farmers and ranchers. They understand that good research translates to higher yields, greater efficiency, and higher profitability.

I, along with the farmers and ranchers of the 3rd district, am proud of the outstanding research that is being conducted at Mississippi State. I hope that this subcommittee will recognize the importance of research funding and its direct relationship to US agricultural competitiveness on the world market.

Mr. COMBEST. I will recognize all of our witnesses in a moment with the various hats that they have on, but I would be remiss if I did not introduce a constituent. He is a good friend and a tremendous contributor to agriculture for many, many years, Dr. Robert Albin from Lubbock, TX and Texas Tech University.

Before we get started with your statements, I want to follow up, if I might, just a little bit on what the gentleman from California, Mr. Dooley, said because I think that he made some very good comments in regards to and expressed my feelings of where I'd like to start down this road of reauthorization of the research title.

Having just come off of chairing the Intelligence Committee for 2 years and just finished as serving with vice chairman with Senator Moynihan on a commission to redefine secrecy and security, how do we redevelop those definitions and the roles, but one of the major challenges that we undertook in the Intelligence Committee was to define intelligence for the future. And so many times once a program has been in place as I've mentioned 15 and 20 years in my opening comments, we seemed always to assume that what we have today is the best.

I think Mr. Dooley is exactly correct in looking at this in terms of what would we do today, given what perimeters, what guidelines and what definitions that we have about the needs for the future, differently than we would have done it 20 years ago or how would we do it today if we were just starting today. We always seem to go back to that same pattern that was established years ago and maybe it worked then and it may not have anything to do with the bearing of today, but given the challenges that we have and a shrinking budget, less dollars to expend, I think it is incumbent upon us and upon you to make for certain that every dollar that it is expended in agricultural research maximizes the research.

I think we need to plow some ground here that some people are going to probably think is fairly controversial. Some people are going to think "gee, they're getting way off track." But I don't believe we're doing the service to the farmers and to the Nation as a whole if we don't look at all varieties of options that may be there today to maximize the return for the dollars invested. And I think that the cooperation between private and public expenditures and research should be reviewed and delved into more than we have ever done before.

To make for sure that we are not spending duplicative dollars out there trying to find out the same research, that we don't have such a turf battle out there that we are afraid to share with others what it is that we are doing, and to make for certain that if, in fact, just because a research facility, a university, a department of Government has been doing something the same way for years is it the best way to do it? Should they be doing what they're doing or should they be looking at something new? So just because it's status quo today, I don't believe it necessarily means that it should be for tomorrow.

It may be that it should, but I'm not aware certainly in the 14 years that I have been here that it has been looked into in depth to the extent of really questioning where we are today, not from a standpoint of being critical, but from a standpoint of recognizing that times have substantially changed.

And that is basically where I would like to take this over the next several weeks and the several hearings is to look at a lot of new ideas and some of them may be good and some of them may not be so good, but I don't believe that we're doing the service that we should be providing if, in fact, we simply move forward with the status quo with allowing, at least bringing into question some potential for some viewpoints in the future that have not necessarily been in the past.

Our witnesses are at the table and I would like to introduce them at this time, in the varying roles that they may be playing today.

Dr. Ed Knipling is the Acting Administrator for USDA's Agricultural Research Service. He is accompanied by Dr. Bob Robinson, who is Administrator of USDA's Cooperative State Research, Education and Extension Service; Dr. Thayne R. Dutson is the Dean and Director for the College of Agricultural Sciences at Oregon State University.

Dr. Robert Albin is the Interim Dean for the College of Agriculture Sciences and Natural Resources at Texas Tech University and Dr. Albin is representing the American Association of State Colleges of Agriculture and Renewable Resources.

Mr. Jimmy Sanford is the chairman of the Cotton Industry Research Task Force for the National Cotton Council.

Mr. Dan Dooley was mentioned as the vice chair for USDA's Agricultural Research, Extension, Education and Economics Advisory Board.

Dr. Elizabeth Owens is with ISK Biosciences Corporation and is here representing the Agricultural Research Institute.

Your comments and written statements, as well as all Members' statements will be made a part of the record.

We would like, if possible, to certainly give you what flexibility, but if it is possible, within a 5-minute time frame, if you could summarize and highlight your remarks, I think that we will begin to get into those in depth in the question and answer period and I believe that Dr. Robinson has some introductory comments before we first hear from Dr. Knipling.

STATEMENT OF BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. ROBINSON. Thank you, Mr. Chairman. I do appreciate very much the opportunity to testify before this committee today and as you pointed out in the introduction I wear two hats today. One is the Administrator of the Cooperative State Research, Education and Extension Service which cooperates with the Land Grant University System, which you referred to in your opening remarks.

The second is at the request of Secretary Glickman, who recently asked me to represent the Department of Agriculture as the lead policy official for the purposes of the Research Title reauthorization which is under consideration by this committee.

The subject of these hearings, the reauthorization of the Research Title, is very important to the future of the Department of Agriculture, and as you pointed out, to the future of the competitiveness of U.S. producers, U.S. consumers and in fact, the public at large. In a context of last year's FAIR Act, science and education provide a fundamental element in the new safety net for American agriculture and its farmers and ranchers. The Department of Agriculture takes that responsibility very seriously.

Mr. Chairman, as we have examined options for the reauthorization of the Research Title of the 1996 FAIR Act, we have been working within a framework that has as its foundation to maintain world leadership in agricultural science and education as a guiding principle for our future development.

We also prefer to use existing legislative and administrative authorities where possible and to encourage efficiencies throughout the research system in order, as you point out, to make the best use of the program resources and reduce duplication. We encourage multi-functional, multi-State and multi-institutional activities in order to best leverage the resources at all levels and to continue to support the range of funding mechanisms that we have in both intramural and extramural research.

The Department believes that formula funds will continue to play an essential role in maintaining research and extension activities at land grant universities and the Department continues to support and insist upon good merit or peer review evaluation for our competitive research programs.

We value an active Federal/State partnership in setting priorities and a public/private sector partnership where we leverage the uniqueness and complementarities of each.

Ultimately, we believe that the responsiveness to national and regional needs is a high priority in setting the priorities with our partners and with our stakeholders in conducting work in evaluating results and ultimately in serving customers and stakeholders. From this framework, Mr. Chairman, we have developed four principles around which we are currently developing a legislative proposal for consideration by this subcommittee at the fourth hearing you have scheduled for later in July. Those principles are (1) the Department of Agriculture and the Research, Education, and Economics [REE] mission area invest in creating and strengthening the research and educational capacity essential to meeting the national goals for the food and agricultural system.

Second, the programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.

Third, the Federal Government has a distinct and critical role to play in partnership with State and local governments and with the private sector.

And fourth, wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as a diverse set of institutions performing research, education and extension.

USDA's portfolio currently contains extramural funding in the form of formula funds, targeted grants and competitive grants in addition to the intramural funding activities which we will concentrate on in a moment.

The administration also recognizes that diversity among institutions in performing research, education, and extension is critical to insuring that our national goals are met effectively and efficiently.

The administration supports USDA's mix of extramural programs in research, education and extension, and is a proponent that formula or base program awards should allow and support maximum flexibility for States to use resources where they have the greatest ability to solve problems.

Represented here today are the two agencies which together advance the goals of the Department's research program. The Cooperative State Research, Education, and Extension Service is engaged in extramural agricultural research with the primarily land grant universities as well as other research institutions. The Agricultural Research Service is engaged in intramural agricultural research.

The mission of CSREES is to achieve significant equitable improvements in the domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education and extension programs in food, agricultural, and related sciences in partnership with both the public and private sectors. In carrying out this mission we cooperate with 59 State and territorial agricultural experiment stations, seventeen 1890 land-grant institutions, including Tuskegee University, 63 schools of forestry, 27 colleges of veterinary medicine, 42 schools of home economics, and the twenty-nine 1994 land-grant Institutions. In addition to the land-grants, CSREES has partners in a number of other research institutions and nonland grant universities.

The intramural research mission at USDA is carried out by the Agricultural Research Service. The mission of ARS, while similar to CSREES in that it primarily conducts long-term high risk research, also serves the needs of the action and regulatory agencies within USDA by conducting research to develop and transfer solutions to agricultural problems of high national priority.

We look forward, Mr. Chairman, to the coming important debate about the future of the research, education, and extension system and we look forward to working with you and members of this committee to strengthen the capacity of our research, education, and extension system.

At this time I would introduce Dr. Ed Knipling, the Acting Administrator of ARS who will present testimony on the intramural research program.

Mr. COMBEST. Thank you, Dr. Robinson. Dr. Knipling.

[The prepared statement of Dr. Robinson appears at the conclusion of the hearing.]

STATEMENT OF EDWARD B. KNIPLING, ACTING ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. KNIPLING. Well, thank you, Mr. Chairman, and I'd like to say that as Acting Administrator of the Agricultural Research Service, I'm certainly pleased to be here to visit with you and the subcommittee this morning and to discuss the mission, the structure, the program scope of the Agricultural Research Service.

I have provided a full copy of my testimony for the record and I'll just make a few oral comments to highlight a few key points in that testimony. Before I actually start, I might just say and I am sure I speak on behalf of the entire panel here, we appreciate all of the favorable comments that members of the subcommittee made about agricultural research and the role that we play to sustain American agriculture. We certainly agree with all those comments as well as with the challenges that you pose before us today.

As the in-house research arm of USDA, ARS maintains a strategically located network of national research laboratories throughout the United States to conduct research on a wide array of agriculture, food and environmental problems and opportunities. Our broad goals are through science and technology to help improve the economic viability and competitiveness of the agriculture and food industry and to improve the quality and safety of the Nation's food supply and environment.

Many of the ARS laboratories are co-located with the land grant and universities and other institutions. This co-location feature fosters research and resource use, cooperation, complementation and coordination and truly represents a real value-added strength of this Nation's entire agricultural research system.

In addition to these research partnerships, one of the most important intramural responsibilities ARS has is to conduct research in support of other department and Federal agencies that depend on technical information and technologies to carry out their program. In this way, we help to insure that their policies and programs are based upon sound science.

Also on behalf of both the Department and the legislative branch, ARS provides and maintains a science and infrastructure capacity to respond rapidly to technical emergencies and to mobilize resources to address the emerging problems.

Now as these statements imply, ARS research programs are directed toward and are responsive to the research needs identified by many customers and stakeholders including this committee and other entities of Congress. Also, ARS receives direction and guidance from the administration, Federal action and regulatory agencies, farmers and ranchers, commodity groups and other farm organizations, corporate entities, trade organizations, small businesses, environmental and consumer groups, the scientific community and many others.

This guidance takes many forms, but includes customer and stakeholder involvement and various mechanisms of program evaluation, both prospective and retrospective to insure that ARS research meets high relevance and quality standards.

Mr. Chairman, this completes my brief verbal comments. More information about ARS programs is in the full testimony and I'd be pleased to respond to other questions that arise later.

Thank you.

[The prepared statement of Dr. Knipling appears at the conclusion of the hearing.]

Mr. Combest. Thank you, Dr. Knipling. As I mentioned, all witnesses' entire statements will be made a part of the record. We have had them and have had an opportunity to look through them and I appreciate that very much. Dr. Dutson.

STATEMENT OF THAYNE R. DUTSON, DEAN AND DIRECTOR, COLLEGE OF AGRICULTURAL SCIENCES, OREGON STATE UNIVERSITY

Mr. DUTSON. Mr. Chairman, members of the committee, I'd like to extend my appreciation for the opportunity to speak here today on the critical issues facing research, extension and education.

I appreciate the kind comments that were made and we agree with many of those. We also agree that we need to continue to look at the system, make sure it's efficient and effective and we have in Oregon, as well as other States, and working on that part of the issue.

I'm here on behalf of the National Association of State Universities and Land Grant Colleges which has formed a coordinating committee to respond to farm bill research and extension reauthorization issues.

This NASULGC Committee includes vice presidents, deans and directors of many of the components of our universities, as well as our national stakeholders group, the Council for Agricultural Research Extension and Teaching, better known as CARET. Mr. Dooley is a member of the executive committee of that group.

With your permission I'd like to summarize my remarks at this time and as others submit more complete statements for the record.

The founding legislation that established the land grants, the State Experiment Stations and the extension system created a new and unique mission, to apply science and technology to the problems of our communities and to convey that knowledge to the people through the classroom and through extension. This vision to integrate research extension and teaching, to address real world problems is what makes the land grants unique among other educational and research institutions.

The land grants are funded through a unique partnership among Federal, State and county governments and also the private sector. Federal investments in research and extension provides the Federal Government access to the research capabilities of the States and an extension outreach system that reaches into every county in the Nation. Every Federal dollar invested leverages some $4 to $5 in State and local funds.

The land grants work closely with their Federal partner through CSREES and we collaborate with the Agricultural Research Service on many of our programs.

The land grants also work with most other Federal agencies as appropriate to the missions of those agencies. For the record, I've attached additional information that describes the history, mission and activities of the land grant.

I would like to reserve the balance of my time to address several of the critical issues that will be considered by this committee: priorities, stakeholder input, accountability and funding mechanisms.

The Hatch Act of 1887 charges the land grants "to address the problems of agriculture in its broadest aspects and such investigations as have for their purpose the development and improvement of the rural home and rural life and the maximum contribution by agriculture to the welfare of the consumer as may be deemed advisable having due regard to the varying conditions and needs of the respective States."

This charge is still applicable today. Some have suggested that federally funded research extension and education projects should be directed only to issues that are of economic importance to production agriculture. Certainly production agriculture is critical to our country and the land grant universities have a long tradition of working closely with agricultural producers. The land grants are committed to continuing and enhancing this alliance in the future.

However, there are many challenges facing agriculture, the food system and communities that are outside what some might think would be a narrow definition of production agriculture. We like to take the expanded definition of production agriculture. In the future, the economic viability of agricultural production will depend heavily on post-harvest handling and shipping, value-added processing, packaging and marketing. Future trading and international competitiveness of agriculture products will depend on our ability to meet food safety standards. Many trade debates will center on sanitary and phytosanitary standards.

To remain competitive and viable, agricultural producers will need to understand international trade and international markets as well as business and investment opportunities overseas. Agricultural producers will continue to phase the challenges to meet environmental regulations and standards. They will continue to need science-based tools to cost effectively manage their resources. The U.S. public will continue to demand a food supply that's only cheap and affordable, but also nutritious and safe.

The land grant universities support stakeholder input in the priority setting and program developing and process. Each university has established a process for soliciting stakeholder input. As an example, I'd like to describe the system of stakeholder involvement in the land grant programs in Oregon. Our goal is to have stakeholder involvement as close to the program delivery level as possible. As a result, we have extension advisory committees for each county extension program, experiment station advisory committees for each branch experiment station and advisory committees for each department on campus. In addition, we have an advisory council for all of our programs in the College of Agriculture.

As a system of land grants have recently completed a national process for soliciting input from stakeholders, this national program conveyed the feelings of over 300 users in a specific survey and this full description of this stakeholder input process is submitted for the record.

In regards to the stakeholder input at the national level, last year Congress decided to resign and streamline the process for stakeholder input at USDA in the 1996 farm bill. This legislation created a National Agricultural Research Extension Education and Economics Advisory Board which Mr. Dooley is going to speak about.

Some have suggested that a new array of panels and advisory groups should be created. We think this is premature and we think we need to use the authorization of the Agriculture Research Extension Education and Economics Advisory Board and convey through them the ability to make other panels necessary for input into this advisory committee.

The land grant universities support effective assessment of accountability and effective assessment of how well we are leveraging the Federal dollars in the States. We feel that current review of the CRIS system, the food and agricultural education information system and the research extension and education information system that is on-going should continue and will develop the next generation of data bases which allow us to monitor accountability.

In order to monitor and measure accountability of our programs in Oregon, we've developed a data base that allows us to measure program relevance as well as communicate how relevant our programs are to our stakeholders. We call this data base Oregon Invests and I have included in your materials some description of this data base. It shows individually project by project, county by county, department by department and research project by research project how valuable our programs are to our stakeholders.

The land grant strongly support the maintenance of a balanced portfolio of funding mechanisms for research extension and education. Each mechanism addresses a unique set of program needs. Various suggestions have been made regarding possible changes in the way that these funds are awarded and reviewed. I have addressed some of these suggestions in my written testimony.

Mr. Chairman, members of the committee, I'd like to again express my appreciation for the opportunity to speak to these critical issues. I'll be happy to answer questions you may have at the appropriate time.

Thank you.

[The prepared statement of Mr. Dutson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much.

Dr. Albin?

STATEMENT OF ROBERT C. ALBIN, INTERIM DEAN, COLLEGE OF AGRICULTURAL SCIENCES AND NATURAL RESOURCES, TEXAS TECH UNIVERSITY

Mr. ALBIN. Mr. Chairman and members of the committee, I'm Robert Albin, Interim Dean, College of Agricultural Sciences and Natural Resources at Texas Tech University, in Lubbock. It's my privilege to present testimony this morning on behalf of the American Association of State Colleges of Agriculture and Renewable Resources, addressing the current and future role of research conducted by nonland grant universities for the benefit of the American agriculture and natural resources.

This organization of nonland grant universities is comprised of approximately 50 other nonland grant universities representing many States. This Association of State Colleges of Agriculture and Renewable Resources, does not receive Federal funding. These universities offer agricultural and natural resources baccalaureate degree programs. Several offer Master of Science degree programs and one, Texas Tech University offers the doctorate in six disciplinary areas.

Graduate education is an important part and component of these programs. These advance degree programs produce students, graduates that go into the industry, that go into Government work, that go to serve stakeholders and others who have an interest in pursuing and promoting agriculture and natural resources.

Mr. Chairman and members of the committee, I wish it to be established initially that this testimony reflects a positive partnership image of intended collaboration with nonland grant universities. To address the current and future role of nonland grant universities in conducting research for American agriculture and natural resources, the following statements and examples are presented.

A number of colleges, schools and departments of agriculture and some have expanded areas of interest, have significant growing research programs which are usually designed to address problem solving for the agriculture industry. These programs commonly address issues of particular important to agriculture, forestry and other interests in the region of the State where the university is located. Results are often applicable to a wider area, State-wide, regionally, and nationally. These programs often involve partnering with other institutions including land grant institutions, private industry and commodity organizations. The latter two, private industry and commodity organizations are sources of funding for many of these projects. In many less urbanized areas, land grant programs have been reduced or deleted generally due to shrinking funds or State-wide research priorities have excluded the area in question. This research void creates needs of stakeholders and private industry who approach the nonland grant university in the area seeking and expecting assistance, but funding is usually unavailable to address their needs. Some nonland grant agriculture programs receive State funds to support these research programs. For example, Southern Illinois University at Carbondale receives approximately $1 million of a $9 million appropriation from the State to address food and agriculture research in the State. Illinois State and Western Illinois Universities who are also nonland grant universities participate in this funding. Texas Tech University receives over $2 million in State funding for research in agricultural sciences and natural resources. Texas A&M University at Kingsville receives over $1 million for similar research and then the California State University at Fresno receives approximately $1 million from the State of California for research in agriculture and technology. An excellent payback would result from a capacity building strengthening grant program for nonland grant institutions, not unlike and very similar to that provided to 1890 land grant institutions and those programs developing for the 1994 land grant institutions. This would enable nonland grant faculty to become more competitive for Federal and State grant funds.

The Association of the Nonland Grant Universities wants to see increased appropriations for the challenge grant program. I might add that Texas Tech has been successful in participating in that program and find them to be most beneficial. Currently, programs to improve the educational system for agricultural students receive a very small portion of the USDA budget. However, the end product, better educated graduates has far reaching impact and it's our goal to see that funding back to the original level of minimum level of $7 million annually.

Now other issues are important to the nonland grants and I would highlight just a few of those. The rest are in the testimony, but we believe a very positive effort is being made and their work to date is most successful and that's the National Agricultural Research Education Extension and Economics Advisory Board, as represented today by Mr. Dooley. This is an important effort on behalf of American agriculture and at the present time, however, nonland grant institutions have no input, no representation on that board and would recommend expansion of that board to include the nonland grant institutions.

We support the eligibility for competitive research, extension and education funding and the nonland grants would certainly emphasize continuing the fund for rural America at its original level of funding.

And finally, emphasis on giving priority to proposals that represent partnerships among various entities and certainly that represents in our State a very viable source of effort for research.

Finally, the requirement for stakeholder input is critical if we're going to stay on the cutting edge of research needs and priorities.

In summary, nonland grant universities are filling voids and meeting needs in agricultural and natural resources research in areas where land grant universities have exited due to their own shrinking funding base or in areas of the States where the historical prioritization for funding of agricultural research did not include that geographical area or need, with opportunity to competitively access Federal funding, nonland grant universities will become more capably equipped to meet agricultural and natural resources research needs and expectations of stakeholders in the private sector. Nonland grant universities offer unique capabilities, faculty and programs which are utilized today in many instances and which can be utilized more effectively if allowed to become competitively more capable through specific access to Federal funding.

The nonland grant universities represented by the American Association of State College of Agriculture and Natural Resources appreciate very much the opportunity to appear before you today and to present testimony reflecting the current and future role of nonland grant universities in conducting research for American agriculture.

Thank you.

[The prepared statement of Mr. Albin appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Albin.

Mr. Sanford?

STATEMENT OF JIMMY SANFORD, CHAIRMAN, INDUSTRY/GOVERNMENT RESEARCH COMMITTEE, NATIONAL COTTON COUNCIL

Mr. SANFORD. Thank you, Mr. Chairperson, for this opportunity to discuss agricultural research. My name is Jimmy Sanford and I operate a family farm near Prattville, AL. Today, I am proud to represent the National Cotton Council, the central organization of the entire cotton industry representing seven segments. I am the chairman of the Cotton Council's industry/government research committee and the topic of research and education is one that traditionally is among the highest priorities of our organization. The Council has submitted its full text and I have the honor also of submitting a full text of the National Association of Wheat Growers' testimony this morning also.

Earlier this year, Senator Lugar provided us the opportunity to consider some very appropriate questions concerning the research and extension system in the United States. Our National Cotton Council research committee convened cotton growers representing every cotton belt region from the far western States to the east coast. We developed our response to Senator Lugar's questions. We addressed the roles of the Agricultural Research Service, research conducted by the universities and research addressed by private sector interest. We would like our responses to Senator Lugar to be included as part of our record of this hearing.

Over the years we think that the public and private research system has been generally responsive to our research needs. We attribute to the success to the feedback and communications between the industry and those who conduct research. We consider the public and private research organizations as partners and as such, we annually work together to provide many opportunities for information exchange. The centerpiece of the cotton educational effort is the annual Beltwide Cotton Conference. The cotton industry in cooperation with the land grant universities and the USDA's ARS has worked for many years to make the Beltwide Conference a comprehensive reporting of research results. In January of this year, over 5,000 farmers, processors, marketers, researchers, educators, consultants, agribusinesses and other representatives convened. The latest findings, whether from public laboratories or agribusiness field plots were reported in nearly 800 individual presentations. A diversity of topics ranging from environmental benefits of integrated pest management and boll weevil eradication to the investigation into new technologies such as precision agriculture and genetic engineering were presented. The Beltwide is only one part of the communications process. For example, last fall we convened regional focus sessions among growers, researchers, administrators and extension specialists to identify the most important issues for research. These priorities are being formally communicated to research organizations.

The Council's sister organization, Cotton, Inc., invests heavily in research. Cotton, Inc. is supported by checkoff funds from U.S. cotton producers and importers of cotton goods. Research funded by Cotton, Inc. is typical of private research in that we can ill afford the long-term, high risk, basic research best conducted by the public sector. Every cottonbelt State has a standing State support committee to review proposals and direct money toward meeting local and State priorities.

Written communications are also used. Annual publication or proceedings of the Beltwide Conferences are made available. In addition to the bound publications, abstracts can be searched in computer data bases developed by our organization. For scientific reporting, the Cotton Foundation is developing in cooperation with the research and education community a peer reviewed scientific journal. Again, the thrust is to provide every possible mechanism to assure information sharing, prevent unnecessary duplication and meet needs of all partners.

Finally, the cotton industry invests significant resources in supporting its own foundation for cotton research and education. Programs of the Cotton Foundation are generally directed toward educational and technology transfer. The Foundation is funded by agribusiness partners which provides additional linkages to the totality of an agricultural research system.

In conclusion, what I have described is not a single effort activity nor committee that will assure effectiveness and efficiency in public research and extension. In contrast, we view this as a smorgasbord or an interdisciplinary approach of multiple opportunities, facilitated by the partnering of industry, State Government and agribusiness. Also, what I describe doesn't happen by chance. It started with a deep institutional commitment with the fundamental understanding that we all have shared responsibilities for meeting the public's objectives for assuring an adequate, safe and affordable supply of food and fiber.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Sanford appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Mr. Sanford.

Mr. Dooley.

STATEMENT OF DANIEL M. DOOLEY, VICE CHAIRMAN, USDA NATIONAL AGRICULTURAL RESEARCH, EXTENSION, EDUCATION AND ECONOMICS ADVISORY BOARD

Mr. DOOLEY. Thank you, Mr. Chairman. I appreciate the opportunity to be here. Since some commentary was initiated about the profitability of Dooley Farms being somehow associated with Cal's presence in Washington, I should let you know that there's more to the story. I also am a reasonably full-time law practitioner. The reason Dooley Farms is profitable is because we hired our cousin, Bo, to run it. He is doing quite well. I wouldn't want you to cast too much aspersion on Cal's absence from the farm.

I have submitted a full statement to you for inclusion in the record. I'd like to highlight a few points. I am pleased to represent the National Agriculture Research, Extension, Education and Economics Advisory Board. I want to thank the Members of Congress for coming up with that name and I want to share some thoughts with you this morning about legislation that is vital to the continued competitiveness of the American food and fiber system.

Many of my comments include some considerable input from Dr. Vic Lechtenberg, the Dean at Purdue, who is the chairman of the board. I want to pay particular thanks to his help with these comments.

Your work and that of your colleagues will play a central role in charting the future success of the historically unparalleled United States collaborative agricultural research and education system. However, refinement of and enhancement of the historically successful system to make it more responsive to current needs and more focused on long term objectives should be welcomed by all who participate in or benefit from that system.

In the spirit of your quest today and your challenge to this panel, I'd like to address just a few things that I think deserve some attention. I think future efficiency and success of the research, the education and extension function require a continued evolution towards programmatic organization and budgeting. National programmatic priorities must be addressed in a coordinated manner which insures that the best available talent is utilized to achieve the research, education and extension priorities and objectives. Flexibility must be provided to allow such objectives to be achieved based upon quality and efficiency, rather than historic agency or institutional alignments.

Currently the research, education and extension system is organized largely along institutional and agency lines. To some extent that historic, institutional and agency alignment has been altered by the reorganization of USDA which placed most of the research, education and extension functions under the REE mission area and under a single Under Secretary.

However, I think more should be done in the future to insure that agency and institutional coordination both within USDA and within the Federal Government. Such coordination must occur as well between the land grant partners and USDA to establish programmatic priorities, budgeting and implemenation of programs to address such priorities. I've included in my testimony some specific ideas that I think should be encouraged as a matter of policy to address those issues.

Let me address for a moment the question of public/private partnership which, Mr. Chairman, is a matter which you specifically addressed. I have to say my experience as a farmer, advisory board member, a CARET representative which Dr. Dutson mentioned, have convinced me that we need to find innovative ways for the public and private sector to work more effectively together.

I do not believe, however, that the private sector can substitute for the important work that needs to be done by the public sector in this field. My experience suggests that private sector research in the agricultural area is focused more on short-term objectives and that we need the public sector to continue the commitment to the longer term objectives and, in particular, basic research.

I also believe there are many things that are very important to the farm and production community which are not subject to easy commercialization. There is an important public role that must be played with respect to many of those issues, particularly issues that we face respecting or related to environmental problems and so forth. These oftentimes are not the kind of things that generate private capital into the R&D area and do not result in research that can be easily commercialized by the private sector. The IR4 program which is designed to make sure that we have pest management tools to serve minor commodities, is an important example. Many of those minor commodities which we grow in California have significant national importance because of their role in exports and generating trade dollars.

Finally, I'd like to just mention a little bit about the work of the advisory board and tell you that it's been an interesting and exciting opportunity for me to participate in the formation of that board.

We held our first meeting in September of last year and I think we have achieved considerable success in the initial tasks which we have undertaken. In particular, we played some significant role in making recommendations to the Secretary about the implementation and priorities to be utilized for the allocation of funds appropriated under the Fund for Rural America. We have nominated and the Secretary has appointed the strategic facilities planning task force which is going to begin taking a look at the various federally funded research facilities around the country and determine their role in meeting the strategic objectives with respect to agricultural research in the future. We have most recently conducted a stakeholders symposium where we invited representatives of the broad array of stakeholders that have an interest in the USDA research, education and extension programs to testify to us about the strategic plan that has been developed by the Department. I can tell you we received—and you folks may be more used to this—a broad array of recommendations and suggestions about what the Department should be doing in this area. We are presently trying to consolidate that testimony and to present some recommendations to the Secretary of Agriculture about what the focus ought to be with respect to the strategic plan.

More importantly, we have recently created a working group to take a look at the annual performance plan being developed by the Department for the first time under the auspice of the GPRA. It will be their plan for implementation of their strategic plan and will accompany each budget request. In that context, our working group has been looking at the proposed new initiatives that the Department is considering. We've been trying to match those with the input we received from the stakeholders. We've been taking a look, in particular, about how it conforms to the strategic plan which the Department mission area has developed. We are in the process this week of formalizing some recommendations to the Under Secretary for consideration in the finalization of that performance plan for the research mission area.

As a part of that process, we have been giving considerable thought to the appropriate role of the advisory board in assuring that the priorities that are being developed by the Department appropriately reflect the needs of the stakeholder community served by the Department's programs. Furthermore, we're looking at ways in which we can determine on a sort of portfolio basis whether or not the programs that are being offered by the Department meet a relevancy criteria.

I can say that the board has been diligent to the point of every member participating actively in these various processes. The Department, so far, has been quite responsive to the recommendations of the board and I think it has the opportunity over time to become a very major force in helping the Department insure that the programs it develops in the research, extension and teaching areas are relevant to the needs of rural America, the food and fiber production system and that it's conducted in an efficient and effective manner.

I'll be happy to answer questions.

[The prepared statement of Mr. Dooley appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Mr. Dooley. Having left the farm to come to Washington myself, I would be very interested in talking to cousin Bo to see if he's interested in moving to Texas.

Dr. Owens.

STATEMENT OF ELIZABETH D. OWENS, GOVERNING BOARD, AGRICULTURAL RESEARCH INSTITUTE

Ms. OWENS. Thank you, Mr. Chairman. My name is Elizabeth Owens. I'm manager of government affairs for ISK Biosciences Corp. and I'm here representing the Agricultural Research Institute. Today, I'm accompanied by Dr. Richard Herrett who is to my left. He's the executive director of ARI.

ARI is a nonprofit organization with a primary mission of facilitating the exchange of ideas on present and future needs in agriculture. ARI takes the position that Federal funding of agricultural research provides leadership that results in funding commitments from other sources of funding including States, industry, private foundations and production sectors.

I believe that your deliberations today and over the next couple of months on the research title will impact the long-term competitiveness and economic viability of America's No. 1 industry. In my comments today I want to focus on one portion of my total testimony. I am representing the for profit sector. We are oriented towards product development and as others have said, we're not the people that alone can solve the complex issues in agriculture, rather I think that it is important for public programs to provide leadership in basic and applied research that can provide the support that the private and production sectors need for their businesses.

For my example today, I'd like to refer you briefly to a chart that's in the back of my written testimony because I'd like to use potato net necrosis as an example of how public and private research kind of coordinates to solve one complex problem, one crop out of over 250 crops that we grow in this country.

As you may have noticed, I have a bag of potatoes in front of me. These are Idaho Russett Burbank potatoes. These are the potatoes against which all potatoes are measured in terms of quality and appearance. You notice they're comfortably brown on the exterior and when you cut them open and I didn't bring a knife because they wouldn't let me through the security system at the airport with that, but if you open them up, they're white on the inside. But if you have a potato that has potato net necrosis and you cut it open and I found a few in my supermarket bag, you'll see a few brown lines running through the potatoes.

This is a significant problem for Idaho where Idaho has an economy that is based on an integrated industry around the potato, but it is also an issue for most of the 50 States because they all grow some potatoes and in every State there is a threat for potato net necrosis.

It's a global market now for processed potatoes. You may have noticed an article in the New York Times recently talking about the plunge in potato prices because of the global competitiveness. And it will be quality as well as the cost of production that will keep Idaho in that business.

Over the past 50 years, considerable effort has been gone into finding a solution to tuber net necrosis problem. First efforts were in growing seed potatoes in isolated areas and certifying the seed to be free of the disease. The public sector also got involved through potato breeding programs, looking for disease-resistant varieties. These depended on international agricultural research which includes a world-wide collection of genetic potato material.

It was a basic research by various universities, experiment stations, USDA on plant viruses in the 1950's and 1960's that showed that net necrosis is caused by a virus and that the virus is vectored to the potato plant by a specific aphid. At that time, private sector research and development was working on synthetic chemical pesticides that could be used to protect potato crops from the aphids. Soon these pesticides were applied on a calendar schedule to control the potato pest. But the heavy spray schedules didn't always result in total relief from the disease. More public sector research led to a better understanding of the aphid virus plant relationship. At the same time, concerned heightened significantly about the widespread use of pesticides. The public wanted more control over pesticides and research to find alternatives.

The private industry has escalated commitments to find new pesticides to control this disease. The technology had led, recently, to integrated pest management programs. The USDA funded the first one in 1972 and it still is in use today. There are similar States or programs in all States and most countries.

I just want to say that it took 30 years to get to the implementation of one rudimentary IPM program on one pest and one crop.

In the last of my remarks, now after 15 years of commercial development, we have biotechnology in the picture and there are new varieties that are coming out of the USDA that are also resistant to this disease.

What I want to say though is that pesticides are still needed. They're still the basis of IPM programs and as you know, last year you passed an act called the Food Quality Protection Act. There is still urgent need for USDA research in support of the implementation of this act. Specifically, I want to say that we need to support the continuing survey of food intake by individuals, including an enlarged survey of consumption by infants and children. This needs to be fully funded to the $6 million proposed by the USDA. Just this month, the Scientific Advisory Panel said to the EPA that the lack of current data on food consumption is a significant weakness in EPA's proposed method of determining dietary risks from the use of pesticides.

Congress must continue to consider funding of agricultural research as an important priority. Funding of research programs support an implementation of food safety legislation are key to the continued implementation and improvement of integrated pest management systems.

Thank you for this opportunity to speak and I'll be glad to answer questions.

[The prepared statement of Ms. Owens appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Dr. Owens.

In order to give Members an opportunity to develop maybe a little more discussion, the Chair would ask with unanimous consent that we set the clock for each Member for discussion to 10 minutes and we'll try to adhere to that very closely and we will do additional rounds, but without objection it will be so ordered.

Mr. Dooley, I would certainly concur with you in your comments regards to the public/private sector combination. There are certainly differences there of interest and I think we need to keep that always in mind.

One of the things I'd like to start and sort of move forward with is Mr. Sanford, if you are looking at a problem in cotton and you happen to be here today so we could be talking about wheat or corn or feed grain or we may want to talk about potatoes. In fact, I think that picture you have there is my potato. I've seen that one before.

And there is a problem that you have or if there is, in fact, just research which is done that makes a substantial improvement in cotton, the cotton industry is the recipient of that research. You benefit from that, generally financially. Or again, what or corn or whatever. If there's a research that leads to the fact that you can genetically splice the gene that is in wheat into cotton and you could grow cotton at 40 degrees, you're going to benefit from that. We certainly are out in Lubbock, no doubt about that. And they'll start growing cotton in Michigan.

There are private companies that are looking at that and sometimes this gets into information which is confidential so we won't talk about any names. I'm sure most of us have been to many of those companies that are doing various types of research and obviously if that company can be the one that develops that cotton seed, let's say, that can do that, they stand to also reap great financial benefits.

And if there is a university that is working within the land grant system or not, a nonland grant university and with cooperation with USDA, research that they are doing is also looking toward trying to develop plants, cotton, corn or other plants that are much less susceptible to weather conditions, drought, too much rain, whatever, insects, whatever, then there are benefits that are obviously economic and financial to that particular commodity and overall the American people and hopefully the world benefit from that.

One of the concerns I have and interest I have is let's say that company who happens to be doing that research on cotton to develop that seed that the industry is making an investment, a university is making an investment, USDA is making an investment, what makes for sure that everybody works together so that one knows what the other is doing or because of potential concerns from the public, there was a biotech tomato which was recently developed and there was tremendous outcry about the concern some people have over an environmental issue of genetic splicing in regards to food that we eat, pesticides and herbicides obviously enter into this. So sometimes there's not a desire to go out there and publicize the work that's being done.

What I'm concerned about is that you don't have four different entities all with the same result as a goal who are doing the same work and not working together, so if you, Mr. Sanford, through the cotton industry, is willing to make an investment, how do you decide where that investment is going to go?

Do you, Dr. Albin, at a nonland grant, Dr. Dutson with a land grant, the gentleman with USDA, how do you coordinate all of that so that we are certain we're not spending a lot of duplicative dollars out there and where do you actually make that investment?

Mr. SANFORD. May I respond?

Mr. COMBEST. Please.

Mr. SANFORD. That's an excellent question and one that often comes up in many circles, especially the producer ranks. They're concerned about duplication. They're concerned about lack of efficiency. We tend to view the issue that you have so well captured as being like a pyramid and the base of the pyramid is public research and as we go to the top of the pyramid which I would liken to the company who is delivering the final product to the tax payer, to the citizen, to the U.S. citizen, that's our ultimate objective, is to deliver a quality, safe product to the consumer, whether it's food or fiber.

As Congressman Cooksey alluded to in his preamble comments, the scientific approaches, if you narrow scientific approaches too narrow or too concentrated and get myopic about it, then we really risk the vulnerability of being able to maintain the leadership that this great country has had over its history. And you refer to, in your comments, that we've gone from one person providing 15 to one providing 96 and as Congressman Everett so eloquently made a comment at a field hearing in his district, agriculture and agricultural research has allowed those 86 people the difference or 81, excuse my math, it's allowed those 81 people to pursue other pursuits. What greater job creation than what agricultural research and agricultural has provided, so yes, the duplication is of great concern and in the cotton industry we have tried to create an interdisciplinary approach where we maintain communications going both ways and we look at all this as a partnership between producer, research and business. And we all have the same objective and that is to provide that quality product to the consumer.

I don't know whether I've adequately addressed your concern.

Mr. COMBEST. I guess what I'm kind of looking for fundamentally how does it happen that this takes place and Dr. Dutson, Dr. Albin, where do you get your marching orders as far as what research is it that you're going to do and also I'm interested in what restrictions are there, let's say if USDA is helping to fund a research program at a university and the cotton industry or the wheat industry or the corn industry is interested in also putting in additional funds, are there limitations of what can be done there? Are there restrictions inherent in the system that prevent us from being able to be as efficient and effective?

How do you decide, Mr. Sanford, that you're going to put X number of millions of dollars into a research project at Texas Tech University that maybe USDA is putting money into for that study?

Mr. SANFORD. We have, as I'm sure as Congressman Dooley and Dan can attest to, when we see a need and we have a lot of needs, we have a lot of wants too, but obviously our needs are more important and when we see a need, I personally contact our land grant college. That's the first starting point and then they have a network and I think the land grant college network is the greatest system. It's really patterned after the Internet and if you're looking to increase the vulnerability of American agriculture, you consolidate the agricultural research and that scares me. Because you're consolidating the scientific approach, so I like to keep the land grant college system as diverse as possible and through their network I have used research from the University of Georgia, although I'm an Alabama producer. I have gleaned information from other land grant colleges, so the duplication aspects are the—or the resolve of the duplication aspect starts with my first contact to the local land grant college.

Mr. COMBEST. Yes, Dr. Dutson?

Mr. DUTSON. Let me give you just a little example in the Pacific Northwest of a program that I think addresses some of the issues that you're talking about. It's the area of small fruits research. It's a minor crop area and we have developed what we call the Northwest Center for Small Fruits Research. And I have provided for the committee members a little booklet which describes that Northwest Center for Small Fruits Research. It is a cooperative program whereby stakeholders are part of technical committees in each of five different subareas of small fruits research, ARS scientists and university scientists and industry scientists in addition to growers participate on those technical committees. Now these technical committees set priorities for research and actually decide upon funding for not only industry dollars, but decide on funding for some of our State dollars, decide on funding for some extra mural research that comes out of ARS as well as funding that comes through CSREES through the special grants program. The contribution of the industry is about $3 million a year, actually more than the contribution of extramural research from CSREES and from ARS. Each year we have a workshop where the research for the previous year is presented and then each technical committees review that research effort, review the priorities for the next year's research and set the priorities and the scientists from anywhere can apply to this program in these priority areas for the next year's research and the actual priority setting is done by those technical committees which involves everyone in the program, so I think if you look around the system you'll find a number of different kinds of systems like the potato research program that involves both the land grant universities and ARS, function on a similar kind of fashion. In the Northwest, we have wheat research that is managed essentially by a tri-State research committee involving the three wheat commissions of Idaho, Oregon and Washington.

Mr. COMBEST. My time is up so I can't ask any more, but I would ask any others if you had—Mr. Dooley, you were raising your hand. Just any other comments.

Mr. DOOLEY. I'd like to say that I think with respect to the land grant system and the Department's programs, there's a lot of coordination that occurs during the budget process. The various committees on organization and policy of the land grant system spend a great deal of energy and effort in working with the Department in making budget recommendations for both the intramural research programs of the Department, as well as the cooperative State/Federal programs.

I'd like to just mention an example. In California, they have a program priority policy setting process that is annually undertaken which includes input from a whole variety of stakeholders that participate or receive the benefit of those programs.

There also is what's called the California Commodity Committee which is a group of well over 40 commodity groups that have organized in a fairly formal way to work with the university in developing priorities and programs. The result of these activities is that at the University of California with three colleges of agriculture, they have about a $237 million budget that funds the agricultural experiment stations, the extension service and so forth. About a quarter of those funds come from the Federal support including competitive grants. Half come from the State Government and the balance comes largely from the private sector. So there is a very substantial public/private partnership supporting those general program activities in California.

I don't believe that that model is substantially different than what you would find in most States. I think to support what Jimmy said, when you get down to the individual commodity that the primary linkages with the land grant institution in the area where the needs arise, and those linkages are very firm and very strong, I believe.

Mr. ROBINSON. Perhaps, Mr. Chairman, I could add just a couple of comments to what has already been said.

One additional thing that we do collectively is to try to arrive at the highest priorities. Both at the State universities and the national ARS labs respond to commodity groups and farm interest groups. There is another activity specifically that we participate collectively in and that's the regional research committees. In regional research committees we try to draw together and insure that we're not duplicating among regions, but we are actually leveraging dollars, not just from CSREES as partnership with the land grants from USDA, but ARS also sits in those regional committee meetings to insure that we are trying to focus dollars in a nonduplicative way to the major problems that have been identified with stakeholders.

Mr. COMBEST. Mr. Albin.

Mr. ALBIN. Mr. Chairman, I'd like to comment relative to your introductory remarks about what holds this together, what makes it work?

It's been our experience, two things are of primary importance. One is funding and the second, the stakeholders and private sector and I would use the vast cattlefeeding industry of the Southwest as an example. We're in an area where the need exists, the expectation exists for meeting that is Texas Tech and we do that, but we don't do that alone. We do it with our partner, Texas A&M and we do it with our partners in the industry, the Texas Cattlefeeders Association. They expect collaboration and partnership in the research effort. They expect to put up some money, but they expect also the universities to fund some and from a private sector and also then from the individual stakeholders. That particular organization is not unlike many—we have 32 different commodity organizations in the State and they all have representatives that sit on an advisory council among themselves and they watch over what's going on and they expect results from that and as a result they expect money to come from other sources.

I think there's a tendency to expect to put more on the producer that well, they're the ones that benefit from this and those persons should put the money in, but the other side of that being involved also in a family, a corporation farming operation, we're in the business of producing food and fiber for the American people and they're the benefactors, so it's not an easy issue to say this group or that group. It is a collaborative effort from a funding source and that's what drives the effort primarily.

Mr. COMBEST. Mr. Dooley.

Mr. DOOLEY of California. I'd like to back up a little bit and start off with Dr. Knipling and Dr. Robinson.

We have the $1.8 billion that we're spending basically on research through USDA. Is there a common set of objectives and principles, basically, a mission statement within USDA that is guiding where those investments and how USDA is structuring their operations, both in ARS as well as through the cooperative State research system?

Mr. BAESLER. Yes, there are. There have been all along and I think this is actually come into even greater focus just in the past few years with this strategic planning activity of the Government Performance and Results Act that I believe you or others mentioned.

The Department has defined some overarching goals and outcomes and all of our plans are then agency level plans and various subsets of the agencies are aligned with hierarchy of overall goals and outcomes and I would also point out that these are in turn also related to the purposes of research that have been outlined by this committee and the existing farm bill, the so-called eight purposes of research and so those are, in fact, the overarching umbrella guiding principles, goals, outcomes, purposes, whatever terminology we use.

Mr. DOOLEY of California. Sure.

Mr. ROBINSON. Perhaps, Mr. Dooley, I could add just a bit to that. In the development of the five goals that are the core part of the Department's strategic plan, they were developed in concert with a number of stakeholder groups including meetings around the country and regional meetings where we reviewed earlier drafts of the strategic plan as it was being built. The earlier draft of the REE mission plan is best described as an overarching plan from which ARS has a programmatic area, the land grants in cooperation with CSREES and it is this overarching aspect that tries to tie the components of our research program, intramural and extramural together, but it is also dependent, I might add, on continuation of stakeholder input in the annual performance plans that we develop from the strategic plan to insure that we are, in fact, addressing the highest priority issues and to insure that we are coordinating our efforts between the entities, the land grants and ARS to address high priority issues.

This is our first experience with this type of plan. We've had a number of different plans that have been strategic plans for different agencies, for the predecessor agencies to CSREES and to ARS, and many of the other Federal agencies as well as the land grant university system. This is the first time we actually have a plan where we're trying to fit these components together in such a way that best addresses the highest research priorities.

Mr. DOOLEY of California. I'd be interested in maybe a brief comment from some of the stakeholders in terms of your evaluation and assessment of the task in the success of the Department in identifying what the objectives and priorities are and their ability to articulate those in a manner which is understood by the industry and other parties that want to be involved in the research.

What I'm wondering is, is this system working? And do you feel like you have the ability to influence?

Mr. SANFORD. May I respond?

Mr. DOOLEY of California. Sure.

Mr. SANFORD. We, in Alabama, and I have to use—pardon the personal relationship reference, we, in Alabama feel like the stakeholders should have greater input and so we have through the State support committee and our Alabama checkoff system grant approximately approaching a quarter of a million for research projects that should be matched to address some of our problems. I'm sure this is duplicated across the cottonbelt.

What we do which Cotton, Inc. really started the model of this in our industry is that we get together with the investigators approximately the December to January period of each year with the land grant colleges in our State and we have two land grant, one 1862 and then we have an Alabama A&M 1890 and Tuskegee University. Likewise, we also have representatives from the University of Florida which also appear before our committee. These investigators, along with approximately 15 to 18 producers sit down and discuss the problems they had in the previous production year. They interchange with the investigators to convey these needs and then they ask the investigators to come back in March, some 3 to 4 months later and present proposals for research projects that will address these needs. And I think and then our committee through the budgetary process sets the priorities and it gets quite heated, as you can imagine, among producers saying——

Mr. DOOLEY of California. Sure, Jimmy. But I guess there's nothing incompatible with the process that you're engaging in in terms of the way that it correlates with what USDA is doing, with their broader overall identification of priorities and objectives.

Mr. SANFORD. No sir. We think it enhances their model. We think we are the missing link, so to speak.

Mr. DOOLEY of California. Thank you.

Mr. DOOLEY. I think it's fair to say that there has been some frustration over the years about the ability to influence the national priorities for the USDA research programs. But I think the process that's been described that Bob and Ed have mentioned is a new one. The Department presently is developing their first performance plan under the GPRA which will accompany their budget request for fiscal year 1999, if I have those years right. So it is a new endeavor and as a part of that endeavor, I think the Department, and particularly under Bob's leadership, really reached out to the stakeholder community to get a lot of input.

The other thing I think is new is the advisory board. I'm among the first on the advisory board to not want to create too large of expectations about all of the things it can do because the fact of the matter is it's composed of volunteers. But I think that the next linkage is for the advisory board to develop relationships with the stakeholder community in some sort of formalized fashion which we're endeavoring to do now. It can then do some cross checking to make sure that the performance plans that have been developed by the Department, in fact, are generally linked to the needs of the stakeholder community as expressed to the Board. Finally, the board needs to look after the fact and see how they performed. Did they meet the expectations? Did they perform as they expected they would and if not, why not, and what should be done differently in the subsequent years.

Mr. Dooley of California. Dr. Owens, in your written testimony you have another example in terms of your support for the plant genome project.

I guess I'd be interested in terms of this $1.8 billion that we're spending, we got the priorities again that have been established, the objectives. Do you think that this again, from your perspective and your associations or institute's perspective, you know, are you—are they reflective of what you think the priority should be?

Ms. Owens. Well, I think that we would agree that the USDA should lead in basic research and the plant genome project is a good example of that. I didn't get to mention in my testimony here, but I have it in my written testimony that biotechnology is an area that industry has now gotten into, only because all the basic research was done previously in the public sector.

So I think that in general we support those kinds of priorities.

Mr. Dooley of California. If we have pretty common agreement in terms of the priorities and objectives, people can focus on that. Then I step into the budget and the allocation and how we're allocating those and I wonder, are we really allocating these funds in a manner which is really allowing us to maximize the achieving of those objectives and specifically I'd like to get some comments on the way we allocate money under the Hatch Act as well as the Smith-Lever Act which comprises a good portion of these funds. The allocation is based on a formula, on the Hatch Act, it was frozen in 1955 base level. It was also then on the amounts that go above that you have 25 percent for regional research, 20 percent equally among all States, 26 percent based on farm population and 26 percent based on rural population. Smith-Lever is a little bit different. It was frozen in 1962, but you have 20 percent of the funds above that allocated to all the States, 40 percent based on farm population, 40 percent based on rural population. If we have these set formulas that are in large part based on farm population, is that directly correlated to achieving our national priorities and objectives? I mean does farm population—look at the State of California by far and away the leading agriculture State in the Nation. We probably don't have one of the largest farm population. Are we basically using a formula that is outdated and is the Department. My question to you, are you advocating some reform in this that might make it more effective in being consistent with the priorities that you've identified?

Mr. Robinson. Perhaps, Mr. Dooley, I can address that from two perspectives. In my formal remarks and the remarks submitted for the record, I did point out that the Department does support an array of funding mechanisms for research and education, one of which is formula funds. Now there are two aspects of the formula funds that relate to your question. The first is a generalized investment of the Federal Government in the research and education capacity at the land grant university system. That investment allows us to pull together an array of disciplines, and scientists to address issues important to the Government at the national and regional level.

There is a lot of history, as you well know, behind formula funding and there are a lot of questions that have been addressed with regard to formula funding specifically. The questions contained a year ago in Mr. Robert's list, the questions contained in Mr. Lugar's list of questions and some information inquiries that have come out of the deliberative bodies on the Hill now are questioning should we take a look at the formula funding mechanism as one of the prime mechanisms for funding land grant research.

I think the Department's position is that any time we begin to tinker with this we start from the goal of trying to decide specifically what we want to do with formula funds. Then if there is a desire on the part of Congress to study formula funds in terms of meeting that predetermined set of goals, the Department certainly would support that.

The issue that exists, any time there has been a debate with regard to changing the formulas, that are used for the distribution of those funds, is it creates winners and losers. That winner and loser creation, I think, should be guided by a set of goals that we want to accomplish rather than just debating the wins and losses to individual localities.

Now that's one part of your question. The second part of your question I think has to do with priority setting. I think the current strategic plan and performance planning mechanism that we have in place not only meets GPRA, but in fact, begins the development of a planning process between the land grant university system, ARS and USDA which is improved, I think, over anything that we've had in the past. The allocation of those funds for intramural research on that are going by formula, by competitive grant or by targeted grant to the land grant university should address that set of priorities. So there are sort of two sides to that issue and yes, one could debate the validity of the current formulas, but more importantly, it seems to me is what do we want to accomplish with the formulas and how do we best address that line of funding to high priority needs.

Mr. Sanford. May I respond to that question?

Mr. Combest. Sure.

Mr. Sanford. I find it very interesting that Congress is discussing in a lot of areas the issue of block funding in trying to put priority setting and decision and implementation of programs on a local level. I think the formula funding is original block grant of Congress and I find it interesting that we want to change that in light of all the successes that we've had through the process that we've experienced.

I personally think, I'm an advocate of formula funding. Unlike lab research, which lends itself to competitive grant process, agriculture needs site specific research and I think each State of this great Nation of ours needs the base formula funding to do the site specific research.

Mr. COMBEST. Mr. Smith.

Mr. SMITH. Thank you, Mr Chairman. The problem with 10 minutes is it tends to go for 15 minutes once you get on a roll with these questions.

I served on the Joint Council on Food and Agricultural Sciences, producers representative, Mr. Dooley, one of the predecessors of your group. I was always very concerned at the lack of criteria in evaluating research efforts and projects that would result in the benefit of the farmer and rancher of this country. We get on such a if you will roll with ARS, with the scientific community, that any research is good just for the sake of research. We see pressures coming from industry with their co-pay and cooperation and encouragement by coming up with their own funding to match or supplement State and Federal funding that very often we see research that ends up to the benefit of the processors and the packagers and the distributors.

I'm concerned as we see smaller farmers in this country going broke and going out of business, as we see the medium level sized farmers that are buying up the smaller farms and simply working longer days and working harder in an effort to come up with the kind of profits that allows them and their family to live in a fashion that their city cousins are existing.

So I guess my question to all of you is how do we implement the kind of research that's going to benefit the farmers and ranchers of this country and I know there isn't any answer and I know—but one of my questions I would like you to think about and maybe respond to is what is the last research project that was successful that increased the profits of any farming group in this country? And Mr. Chairman, I'm disappointed that the food belt of this country, the soybeans and the corn and the wheat are less represented than I would like to see them represented in this group. I'm disappointed that the livestock industry isn't here. I hope they will be in the future. The poultry industry and especially the dairy industry of this country. We're losing dairy farmers by the drovers.

Mr. COMBEST. Without coming out of the gentleman's time, the Chair would indicate that we're having three additional hearings and there will be one dedicated to commodity groups.

Mr. SMITH. In an effort to—I know that we've had an effort to hopefully have producer representatives sort of combine their ideas, but here again you have some producer groups that are interested in low cost for the price they pay, for the feed input and some groups that are hoping to have a higher profit by having a higher commodity price on those particular commodities.

Can anybody respond to me what you think is the last research project that increased the profitability for more than two years of any producer group in this country?

Ms. OWENS. I would like to cite an example for apples. I worked in the apple industry doing research in Massachusetts and New England. I would say that a lot of the research that was done in the land grant universities in that area on integrated pest management that allowed producers to have a better idea of when certain pests were going to be there and when they needed to apply chemicals to control those pests has really lowered their production costs and has allowed some of those smaller producers to stay in business and produce a quality apple that the people in the local markets want to buy. Recently, they initiated an initiative to label produce that's been produced under IPM as labeled that way and that's giving the consumers an opportunity to support that activity.

Mr. SMITH. And the price of apples either increased or remained stable? The price of apples didn't go down out West like they did in Michigan?

Ms. OWENS. Well, the price of apples has to some extent remained stable, but if they hadn't had a research that allowed them to lower the costs of the input——

Mr. SMITH. Then apple prices would have gone up or else they would have gone out of business.

Ms. OWENS. Out of business.

Mr. SMITH. Well, I mean maybe there isn't any solution. Maybe the competitive nature of agriculture means that only those that profit from these research are the ones that first are into take advantage of that new research initiative, but I think if we're concerned—one of the criteria I think we should be asking, Mr. Dooley, whether it's research or education or whatever your group has encompassed in terms of your advice to Congress and to the Department of Agriculture and to the country, is research directed benefit the U.S. farmers and ranchers and in that regard will the research increase the profitability or the well being of those farmers and ranchers?

We are facing tremendous competition that's going to grow dramatically and as we gauge to the glory of research for research sake and as we move into the consumer demand that we have a better and more nutritious product that's packaged and prepared in a better way, I think it's too easy to lose sight of the more difficult problem of how do we direct research at where we need it, if we're going to continue to have a strong agricultural industry in this country and that's for the producers and ranches.

Mr. Dooley?

Mr. DOOLEY. Well, I'd like to just make a couple of comments. I think the question of competitiveness of American agriculture has been a principal concern to the advisory board in our review of the Department's strategic plan and performance plans. In our recommendations to the Secretary about how the Fund for Rural America should be administered.

I think we share your concern that that was stated in the farm bill of 1996 that increasing competitiveness is one of the very highest priorities that we should have in our research and education efforts, particularly in light of the restructuring of the commodity programs.

I will tell you as a farmer who grows quite a lot of corn by the way, we have benefitted directly in recent years from collaborative cotton breeding done by USDA, the University of California and private industry in California and our yields have increased substantially in part because of that.

We have benefitted dramatically because of work done by the University of California on crop mapping in cotton which is a methodology that's been created to help us determine when to irrigate and when insect control is critical and that sort of thing. The net result is over the last 15 years, our production has increased probably close to 40 percent.

Mr. SMITH. And what percentage is your net profits increased?

Mr. DOOLEY. Dramatically.

Mr. SMITH. Ten percent?

Mr. DOOLEY. Oh, more than that. And prices have been relatively constant during that period of time. There have been some low points and some high points, but the fact of the matter is that we're producing a little over 3 bales to the acre now when we were producing 2¼ bales to the acre in the early 1980's and that's a direct result of the collaborative state, Federal and private research.

Mr. SMITH. And of course, the other question is I'm also a farmer and I have about 2,000 acres, but what I've seen in applying these risks to this research is I get the advantage maybe for 1 year, maybe for 2 years, if I'm right on the doorstep of that research and am one of the first to implement that kind of innovation and research and then unless I've seen my profits per acre remain very stable, so my expansion of acres sometimes have increased the probability, but what that means our farm programs or research, I think have not been beneficial and have probably been somewhat detrimental to the smaller farmer in this country. And so we have seen producers tend to get bigger.

Let me express another concern I have and see if ARS, if somebody can guide me on what we're doing and that is that a lot of our agricultural research effort from our basic research to our applied research is monitored very closely by the scientific community of the rest of the world. They are, in effect, looking over our shoulder as we publish those reports and what I have observed is often they end up implementing this research more quickly than we do in this country, so they take our basic research and move it into an applied aspect or they take our applied aspect and through an effort that's copied our extension service actually get it implemented in those countries and the other problem along that line in research for research sake, I see research that's been conducted in the past that's really less applicable in our country than it is in some other areas of the country. Just a quick comment and then my time is up.

Mr. Knipling?

Mr. KNIPLING. Well, Mr. Smith, yes, we've all observed that, but I don't think it is a dominant trend. Certainly the science community is a global community. It knows no boundaries so to speak. I think one of the actual strengths of our system is that we can share across political boundaries.

Mr. SMITH. How many staff people do we have in USDA that are monitoring the research of other countries in agriculture?

Mr. KNIPLING. I don't think we have any. I wouldn't characterize it as monitoring, but instead, would say that every scientist we have in the ARS and in the university system has scientific collaborators internationally. We have a lot of international scientific exchanges. I just participated in a meeting last week where I met my counterparts from France, England and Canada where we talked about collaboration. We are benefitting from this and I think on balance it's not a major dominant trend of concern.

Mr. SMITH. Mr. Chairman, thank you. *I conclude by saying* I suggest we be more selfish and making sure that the beneficiaries of our research are our producers and our producers are farmers and ranchers and our consumers in this country as opposed to general, some more generally broad spaced criteria.

Thank you.

Mr. COMBEST. The gentleman's time has expired. Mr. Brown.

Mr. BROWN. I really would like to comment on the remarks of my good friend from Michigan a little bit more, but maybe we can do that later.

He is correct in that a good deal of research does not benefit the small farmer, but that's because of things not related to the research. It's because of their lack of capital to utilize the research more than anything else. The dairy industry being a classic problem with—or example with the bovine somotrophin. The big farmers get the advantage and it does increase productivity, but unfortunately in agriculture increase in productivity frequently decreases profits and that's not a matter that research is responsible for. It's the way we organize farm policy in this country.

Mr. SMITH. Yes, but if the gentleman yield for just a quick retort.

Mr. BROWN. Yes.

Mr. SMITH. Still, there's a lot of research that can be done that's going to directly benefit even that small farmer and sometimes if that's a criteria and a consideration, then I think we would increase our propensity to have that kind of research.

Mr. BROWN. The gentleman, as I say is correct, but I hope that he doesn't become prejudiced against the value of research because I'm prejudiced for research and I hate to have a distinguished friend on the opposite side of that argument.

This hearing, I want to compliment the chairman for. It's a vitally important step as we move toward reauthorization of the agricultural research provisions. I think we would all recognize because of the major changes we've made in agricultural legislation, the commodity programs are going to have declining importance and the research programs are going to have increasing importance and we need to give additional thought to how we can improve these programs and for one thing make sure that research is focused on the needs of the small farmers as well as the large producers. I think we could be helpful in that, although that problem is really imbedded in other areas than just the research area.

I note because of the presence of another Dooley in the panel that this is reminiscent of a hearing that I conducted when I was chairman of this subcommittee about 15 years ago and the Cotton Council in this case brought in my cousin from California who managed a cotton gin and I wondered how they were able to select such a competent person.

Mr. COMBEST. The tradition continues.

Mr. BROWN. Well, as long as all the facts are disclosed, I don't think it's inappropriate.

There's a number of comments that have been made in this testimony which raises a lot of questions with regard to the importance of agricultural research and related activities and I want to compliment Mr. Dooley, as long as we brought his name up. I think the testimony that he has given with regard to the overall decline in agricultural research relative to other research and relative to the measured percentage of the gross national product is extremely important. It is a fact in my other committee, the Science Committee, we track these things very closely and while all research has declined to some degree, agricultural research has probably been at the bottom of the list in terms of keeping pace with what you might call the needs or keep maintaining its historic percentage of the research dollars that the Federal Government allocates and I have been interested for the last several in trying to change this situation. I don't think it's going to change here in Congress without some outside pressures that would move it in that direction and the fact of the matter is that the agricultural research communities and the universities are just not very aggressive when it comes to pressuring Congress. Is there any argument with that statement from some of you? Any of you?

Scientists in general have that point of view. They have this feeling sort of that their work is sacred and if we don't worship it like they do, while we're going to hell, but they're not going to do anything about it.

There was some suggestion and perhaps you made it, Mr. Dooley, that the research committee that you're representing here could develop a little closer relationship or collaboration with the user community and that out of that might come some strategy that could be used to influence the Congress to a greater understanding of the importance of research.

Did you have something like that in mind or am I misquoting you?

Mr. DOOLEY. Well, I didn't say that precisely, but I do think, well, I think there are a couple of interesting phenomena going on. This is the first time that I can recall or that I've discovered in research when the commodity programs weren't in the process of reauthorization at the same time as the research title was and the consequence of that in the past I think is that the national commodity organizations were not as actively engaged in the substance of the research title as they have become this year because the commodity programs are not up and the research title is up independently. And while there is some disagreement within the commodity community about what the research title should look like in the final analysis, I think it's been quite healthy for them to become engaged in more direct and assertive way in this issue and I think the result of that will be perhaps some more statement of support for certain provisions of the research title to some of your colleagues, Mr. Brown, as this process moves forward. And I think that's healthy. I think it has also fostered a more direct communication between not only the Department, but the land grant system and the national commodity organizations about what the research title should look like than has occurred in the past for the reasons I mentioned.

So yes, I think there has been some emerging healthier dialogue and more attention being paid by some of the stakeholder groups to the reauthorization than perhaps was paid in the past.

Mr. BROWN. Well, there's one thing you can count on for sure, the research title is going to be different in the future and it—I won't describe it as being revolutionary different, because we have a very firm foundation on which we said, but there's going to have to be a reversal in the level of funding towards moving it up and some refocus on how to achieve the highest quality.

Now it was hoped that the process of having a national, a segment of the research budget that was awarded competitively which was proposed many years ago under the last Republican administration as a matter of fact, that this would create a higher quality of research by making a wider range of research performing institutions eligible to receive agricultural research grants. For some reason or another that competitive program has never reached the level that it was originally proposed to be and we may need to look at that again. We also may need to look at formula funding again. As somebody commented in that connection, whenever you change the formula funding, you always create winners and losers. That's always been true. And the people who made the present formula created winners and losers. Those who created it and pushed it were the winners. Those who failed to take part and actively engage were the losers and that includes California. I think Mr. Dooley mentioned that.

But I am not convinced that California should have a larger amount of formula research funds. I think perhaps they can compensate for it in the competitive funds department, but that does need to be scrutinized very carefully to determine whether the interest of we'll say the large Midwest wheat and corn areas are being adequately met. We examined this several years ago and came up with a new formula which provided more money for research on the problems of the Midwest. California benefitted a little from it, too. Not too much. But we need to examine that alternative formula situation in a very broad light as to what's best for the country because that's what we're essentially concerned with here and I don't think we're going to get to this level of analyzing change as we go about looking at the new bill unless we get a lot more encouragement from groups such as we have before us in this distinguished panel.

Now somebody tell me that I'm being unfair and unjust here, please.

Ms. Owen, you made a statement that maybe I can provoke you a little bit.

Ms. OWENS. I'm easily provoked.

Mr. BROWN. The biotechnology industry was doing great on research today and you said you had built that on the base of basic research funded by the Federal Government before the private sector really developed any momentum in this area. That's also true.

Are you implying that we've done all that we need to do in basic research on biotechnology and we should stop funding that?

Ms. OWENS. Oh no. I'm in no way implying that. In fact, one of the things that may save Idaho and the potato industry is biotechnology and it's not just coming up with a new virus-free potato, it's having new information that might allow us to make the potato into your next flu vaccine, for example, and those kinds of things. So I think there is more research that needs to be done. I certainly think that the genome project the plant genome project would help because instead of taking 50 years to get to a resistant variety, we might be able to use this new technology and get to it in 5 years.

Mr. Brown. Let me make just one comment. The area of national research that's best funded by the Federal Government is the health research field. The reasons are varied, but one of the reasons is that they don't have an authorizing committee to pester the appropriators. They have a very supportive appropriation subcommittee and they have a very, very supportive industry and academic support group that just lobbies the hell out of them and as a consequence health research consistently gets more money than the President asks for. And it will continue to get that more money, even in this budget crisis and they'll take it away from agriculture research.

Now how do you respond to that?

Ms. Owens. Well, one of the things I would cite is there was an article in the—or an editorial in Science Magazine that pointed out that agricultural research has benefitted the health areas and stuff so I think there's an awful lot of overlap and I would say that if you're taking money away from agricultural research you may be taking away from things that might support better nutrition research, that might help us in terms of animal diseases that would eventually translate to human diseases.

Mr. Brown. You're absolutely correct, but that message isn't getting across very well.

Ms. Owens. Well, there was another editorial in Science that said that the problem with funding of science doesn't have to do with the public not knowing about science and understanding science and the politicians not knowing about science and understanding science. It has to do with scientists not understanding politics.

Mr. Brown. That's exactly the point I've been trying to make. Thank you.

Mr. Combest. In view of Mr. Brown's comments and Mr. Smith's comments, the Chair would note in Members' packets there is testimony from National Association of Wheat Growers, American Farm Bureau Federation. We received testimony from the Rice Federation and we'll be very open to and soliciting information and comments from every group that has an interest and we'll have a complete record even though we will not have everyone represented at hearings.

Mr. Everett.

Mr. Everett. Thank you, Mr. Chairman. I promise not to take my 10 minutes.

Jimmy, it's my understanding that several agriculture groups in Alabama are advocating proposals that would essentially restructure research and extension service.

Could you comment on those and give me your evaluation of each?

Mr. Sanford. Yes sir. Auburn University has just recently implemented an interdisciplinary approach on restructuring their research and they have combined the Dean of Agriculture with four other deans on the university campus and this is an attempt to bring an interdisciplinary approach to research of agriculture.

Likewise the extension service has been reorganized in Alabama. It changed its name from service to system. It has interfaced, it has merged, the extension service of Alabama A&M and Auburn University into one system and they are addressing not only rural Alabama needs, but also urban Alabama needs and we think this integrating of services as well as research will bring better results in the future.

Another effort that's underway, Congressman Everett, the model of this resides in your district at Headland, AL, the wire grass substation is a system that's been in existence for quite some time and it is a facility which brings research extension and stakeholders together into one facility and there's a plan and an effort in Alabama to try to duplicate that in six or seven or maybe eight other locales within the State and to try to bring focus to agriculture and natural resources in these research and educational facilities and basically bring the extension of ANR out of the county offices into these regional facilities and that leaves, that frees up the county extension offices to focus on the urban needs and to concentrate on those issues.

Mr. EVERETT. Thank you. Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Dooley?

Mr. DOOLEY of California. I guess I'd like to revisit this whole issue of how we're allocating funds. I'm still not real comfortable with that because again I like people to start, if we're starting from zero here, I mean if you were going to institute a new system, I guess would you create a Hatch formula as presently under law? Would you create a Smith-Lever formula that's currently under law? I mean would the formulas based on rural population which I'm not even sure what the definition of that is. We have rapidly developing areas of the country that become MSAs, is that based on rural population. What is the definition of a farm population and how does that—and then we have it frozen at a base amount in 1955, how is that commensurate with maximizing the objectives that USDA has determined?

Yes?

Mr. ROBINSON. Again, perhaps I could address that and the question you're asking in some detail, I think really requires perhaps a bit of study to try to find out what the objectives of different formula may be in the distribution of funds.

I would perhaps, Mr. Dooley, come back to the central core though that I think and the Department's position is that an investment by the Federal Government in the research infrastructure in the land grant community is a wise one. And that investment should be guided by a set of factors that I think really have been articulated in the comments that Mr. Brown made, you made and in fact, Mr. Smith made. What is it that guides that research portfolio and I think if you boiled it down the three guiding features are the guiding features that I used when I first came to the agency and the Department and it's relevance, excellence and usefulness.

Those three terms are not different. Perhaps the order is what's different and the order asks the question at the outset, what are the relevant problems that the research community should be addressing and that's where we do it in a stakeholder involved priority setting process.

Mr. DOOLEY of California. I understand, but I guess my point is if we are locking up a significant amount of funds that are allocated on an arbitrary formula that was developed back in 1955 and 1962, is that not in some ways restricting the ability to meet the present research demands and needs? I mean we're locking up, what it is $500 million almost in formula funds.

Mr. ROBINSON. Well, Mr. Dooley, the lockup in formula funds is actually less than half that. It's in the neighborhood of about $220.

Mr. DOOLEY of California. Hatch Act and Smith-Lever?

Mr. ROBINSON. No, that is for research. Smith-Lever funds also amount to approximately the same thing, so it is roughly $500 for both extension and research.

The answer to your question is very difficult to come by because wherever one is sitting you could come up with different kinds of logic for adjusting the formula. The based issue that you could deal with is elimination of all formula funds and if one did, then what process would you develop to make investments long-term investments in the research and extension capacity at universities?

I think there is a certain logic for an investment that is longer term which looks at different funding mechanisms. If you do it only from a competitive science driven basis, you're going from project to project. Now what you're actually trying to glean the best science to a set of problems, well, you're not necessarily investing in the infrastructure. I think formula funds do that.

Now that's not to suggest that the current formulas are the only way to do that. I think there is an open issue on examining those formulas, but what, I guess, the only point that the Department makes in that examination not to oppose it, but to suggest what would we want to accomplish in changing formula investment.

Mr. DOOLEY of California. Dr. Dutson?

Mr. DUTSON. Let me give you a little bit of perspective from the local level at the land grant university and within the State of Oregon on formula funds. Rather than thinking of them specifically as quote formula funds that are cranked out by a specific formula, we look at those primarily as a base level of funding that gives us the continuing investment from the Federal system whereby we participate in the larger national picture for the research that we do at the State level.

That is only a small portion, in fact, in Oregon in the research area, that is only about 12 percent of our actual hard dollar investment and less than 6 percent of our total investment in research because we have more than 50 percent of our research investment comes from outside sources, competitive grants. So whether you look at as 12 percent or 6 percent, it's a small amount, but it is a base level that gives us that underpinning and also buys us into the national system.

Now you can argue whether the formula is correct, but that base fund is a really important underpinning for the other parts of the system.

Now the next part of that system that we feel is really important is the State funds. And the State funds that go into that investment in both research and extension are the largest piece and in the extension part I would talk about the county funds and State funds as being together. That's the largest dollar amount and those are essentially to focus on State-related problems, but much of the research that's done there is applicable to the national level, that underpinning of base research programs and the funding that comes from a national level allows us to contribute that into the national scene and the national level.

There's another piece of that funding picture, particularly on research, but also some on extension, which is more targeted and those targeted funds come from the special grants program or other specific targeted research. Russian wheat aphid research, for example, a very important program. You know, there's just a number of specific programs, potato-wide virus. There's some specific rifle shot kinds of activities that come both from the Federal level, but even more so from the grants and contracts that come from private industry.

So that is really the more targeted specific application related research and what we really advocate is a multiplicity of those funding systems such that we can have the base funding which will fund essentially some of the infrastructure, both the State level and the national level. That buys the scientists. That buys the buildings. That pays for laboratory equipment. Then these other specific targeted research programs come on top of that to really make it germane.

Now whether or not the formula is correct, I think that may need to be taken a look at.

Mr. DOOLEY of California. And I guess that's my point is what's a little frustrating to me is that we have $500 million going out in formula funds. That is, we've got $1.8 billion. I mean it's 30 percent almost, not quite, of our research dollars are being allocated on formula. Why isn't that one of the essential points of this debate whether or not that formula is accurate? I mean I have, in 1997, and this information is relatively new to me, we were spending under Hatch Act allocation, formula allocations, $3 million to the Territory of Puerto Rico. We are spending in my State of California, which has a $22 billion agriculture industry, about $100,000 more than that.

I step back and say how is this allocation of funds consistent with the objectives and the priorities that USDA has under even Hatch Act allocations, that we're spending $3 million in Puerto Rico, and $3.1 million in California?

Mr. Sanford, you talked about why should we back away from formula funding and its original block grant. I don't say that we ought to back away from continuing a formula funding or block grant that you maintain a basic level of funding, but I think it's in the interest of Alabama, which actually gets less than Puerto Rico, gets $2.7 million, that you ought to have a vested interest in seeing whether or not we are investing these funds wisely.

Mr. SANFORD. Right, we certainly agree with that. I think every, most people would agree that your point is well taken and there certainly needs to be a dialogue as to bringing the formula up to date.

Mr. DOOLEY of California. Well, all I would say is the time for the dialogue is upon us and I would hope that we would receive, the committee would receive some guidance and any of you tha would choose to add additional comments, I'd be most intereste and I know the chairman would be too.

Dr. Owens?

Ms. OWENS. Just one comment. The National Academy o Sciences study on the land grant colleges of agriculture addresse this point and we had quite a bit of debate over how those fund should be allocated. It's not an easy question because there is som thought that if you look at the ultimate beneficiary of agricultur which is the consumer, that perhaps the funding should be allocated on the number of consumers, so that the consumers woul have more input on where that money is spent.

So I agree that it's a significant debate, but I would refer yo back to our report which came out last year.

Mr. DOOLEY of California. I guess I mean my response to th people from USDA is that to me it seems if you develop your objectives and priorities which we basically had an agreement on tha in terms of process and what they are, is that there also ought t be if this is a new process that you're kind of engaging there to define those and how you incorporate those, that there also ought t be a revisiting of the look of how we're funding our research i order to achieve those priorities most effectively and it seems i we're not doing those in tandem, that we really are doing a disservice to an overall investigation analysis of our research title.

Mr. ROBINSON. Perhaps I could respond to that. And I think th Department's position is not unlike the one you just laid on th table. I think the issue is how, for what purpose we examine th formulas. The formulas were set in place by this body and the Senate in terms of determining the way those funds would be distributed and the criteria that were included in the funds and the Department's position is not one of not being willing or wanting to examine those. We're quite willing to do it.

And in fact, we can run some scenarios that might be useful t this committee on if we changed various criteria within the formula, how would it change the distribution of funds? But again even having done that, Mr. Dooley, I would suggest that still th guiding principles are two: one is there needs to be a long-term, no just a competitive funding mechanisms for agricultural research but both an investment through some kind of base fund as Dr Dutson pointed out and competitive funds, but what are our goal in terms of changing those formula?

We can provide to you what would happen in distribution if w used different criteria to do it. But there are two questions that remain? What would be the goal of changing and secondly, would i leverage the same amount of dollars that it's currently leveraging For example, in research, about less than 20 percent of the tota research budget of land grant comes from formula funds, so you'v got $1 in $5 that is being leveraged out of the system. With th extension, it's about 25 to 27 percent of the total budget on averag comes from Federal funds, still, a significant leveraging of funds

Even more important, if you look at most of the studies that ar out, there is a return to investment in agriculture and research and extension of 30 to 50 percent, so the question is how do yo put that in and perhaps it calls for a comprehensive investigation of what a new formula, set of formula criteria should be and I don't think the Department would be at opposition with the position you lay on the table. And could be very closely aligned with insuring that we've reached the objectives that we've outlined.

Mr. DOOLEY. If I could just make a comment. I think the underlying principles about which everyone agrees is that we need to maintain capacity within the system to be responsive to whatever the priorities are and I purposefully have been quiet about the question of formula funding because I think there's a difficulty in timing and it appropriately should be done at this time, but I mentioned what I think should be a very high priority which is to move towards programmatic approaches to research and education and extension, as opposed to agency or institutional approaches and I think what the Department's planning effort has done is create a programmatic template.

These are the priorities without saying specifically that this is an ARS priority and this is a CSREES priority and so forth and so on. But they haven't yet in my observation, their existing programs haven't really been laid out and displayed under those new programmatic objectives and priorities, so it's very difficult to say, for example, that do you want to have a formula that's based on a high priority to benefit small farmers?

Do you want to have a formula that's intended to enhance competitiveness? It's hard to do that when you can't really display very clearly what your existing programs are doing and I think that's where the Department is heading is trying to get their existing programs arrayed under this new programmatic kind of format and right now I don't think we have a clear picture of where all of the resources fit under those new priorities and Bob and I have had this discussion on more than one occasion and that's in my opinion where we need to get to.

Once you say here's our programmatic priorities, then you can start talking about where we need capacity and where we ought to be focusing our capacity building or capacity maintenance funding in the system and I'm not sure we're quite there yet and that's why we have this difficulty when we start talking about the formula funds because everybody has a different perception of what the criteria ought to be to revise the formula and it's based on some legitimate priority, but it may not be the national priority. And I think that's the direction we need to be moving.

Mr. COMBEST. Let me ask, I guess, initially sort of point this to Dr. Dutson and then others might wish to comment, this will sort of be described as the devil's advocate question here.

But in light of the fact that we have a national network of ARS labs, a number of nonland grant universities which fill in the gaps, is it necessary to maintain land grant universities in each State in the same form that we have today or would it be maybe a regional approach, would that be more appropriate?

Mr. DUTSON. Well, I think there are a number of issues that come up relative to regionalizing say the land grant university system. One is are we capitalizing as best we can on the regional possibilities for cooperation across State lines within a region or subregion, for example, Washington, Oregon and Idaho have a lot of the same problems, a lot of the same microclimates, a lot of the same soils, a lot of the same crops. Idaho, Washington and Oregon on the eastern side are quite similar. Washington and Oregon and Northern California are quite similar on the western side.

So I guess one part of the question is if you did something with the land grant university system, would you be able to better capitalize on the regional possibilities say in that subregion or even in the larger regions such as the Great Basin, which covers a large number of the western States.

I think if you look at the cooperative efforts that we have in those regions, you would have to say probably very little increased regional work and regional cooperation would occur if you took those land grant universities and put them together. So I think that's one question, would you gain some efficiency in the system that you don't have the possibility of doing now. I think the possibility is there of creating those efficiencies and many times they are. The Small Fruit Research Center, that little booklet that you have there is an example of that within those three States.

The other piece of that question is what really is the focus of the land grant university within each of those States. I think that's probably the bigger part of the question. If you look at the funding that comes from the Federal level, versus the funding that comes from the State level, the big gorilla is the funding at the State level, that actually focuses the programs within that land grant university.

Mr. Combest. Are you saying that that would no longer be there?

Mr. Dutson. I think that funding would be there, but it may not be there if you were to coalesce the land grant universities across different States. They would create some other mechanism to have their own land grant university.

Mr. Combest. I just, coming back to what Mr. Dooley up here said in his opening comments, and that was if you were going to develop that system today, not having anywhere to start from, I wonder if it would look the same as it does today? That doesn't necessary conclude that it would be better. I just wonder if it would and I think that's part of what our challenge is as to look at what we've got and is that the best we can do?

Mr. Dutson. Let me give you an example of what we did in Oregon when we took a look at what we were doing with the land grant university within the State.

Ten years ago, we tried to wipe the slate clean and decided where we would put our branch experiment stations around the State if we had to start over again. And we just tried to divorce ourselves as much as we could from what the past was and start with where were the needs within the State. Now we ended up creating almost exactly the same positions for our branch experiment stations that were there at that point in time because they had evolved over a number of years toward the needs in specific growing areas, specific climatic zones of the State.

One addition we felt was necessary and we have gone about creating that and that is a trade marketing and value-added processing branch experiment station located in Portland to serve the international trade and the Portland food processing business industry.

So as we wipe the slate clean, we found that the climatic zones around the U.S. were really necessary, around Oregon were really necessary to be taken care of by these branch experiment stations.

Well, if you went to the regional level, you'd still have that same need within those specific subregions of the State. Now each of those subregions of the State are cooperating with like subregions in the adjacent States, whether it be California, Idaho, or Washington, those States around Oregon.

So our seafood research center cooperates up and down the coast and I think if you really went back and wiped the slate clean, you'd still find that in each individual State there are a number of necessary focuses that are even smaller than the land grant university focuses on.

Mr. COMBEST. It might not be that those would be nonexistent, but I guess your first comment in regards to what kind of impact would that have on other sources of funding, i.e., State funding or whatever, sort of begs me then the question of what. I mean let's take and I obviously don't know nearly as much about it in your part of the country as I might be familiar with it in my own, but then what kind of a situation does that create with a nonland grant university. Texas Tech University in Lubbock, Texas.

There is an experiment station from the land grant university located in Lubbock. Well, Texas Tech is located in Lubbock also. Why can't they do that? And I guess I would ask Dr. Albin, can you give me some examples of or can you give me some thoughts about potential restructuring of this and can you give me some examples of where you have a very close working relationships with the land grant university?

Mr. ALBIN. Mr. Chairman, I'll give you two examples, one for Texas and one in California for Mr. Dooley's benefit. One of the primary problems that have addressed, that we have addressed over time would be first attitude in terms of the need for doing that. As Mr. Dutson, Dr. Dutson pointed out, there has been an attitude that we are meeting the basis, the land grant system is meeting the basis that there are many different opportunities and needs and stakeholder interest and we're taking care of those.

Unfortunately, for whatever reason and I perceived it to be as I've pointed out lack of funding to meet those needs, increasing pressure by political forces, the urban society that causes funding to maybe be put where agriculturally the priorities would not be the same and so it's not a determined interested to exclude those, the nonland grants, for example, but the resources are not there to make that partnership happen.

Now what we're doing in Texas and we're blessed with a fine standard for research at Texas A&M and Mr. Ed Hiler, but the attitude is there now to work cooperatively and to try to meet some partnership, in a partnership way. The stakeholder requests and demands that we're facing in far west Texas, the swine industry is just exploding in the area, the cattle feeding industry is already there and Texas Tech University has been asked over time and has met over time some of those needs, but today the funding base isn't there for us to do that as a nonland grant and certainly the land grant in this case, Texas A&M, is not able to divert resources to existing outstanding programs to focus on a stakeholder group. So

I think the issue to me and it would be some allowance from a Federal standpoint for a partnership to exist for the nonland grants, for the private sector as they would have input to be a part of the system and help officially and also financially take part in that effort.

The same is true at California State University at Fresno and that is there's an increase in demand in that area to provide some specific targeted research programming for some interests and yet there's absolutely no money to do that from either through the land grant system because they do not have the money, not the land grant.

Mr. COMBEST. Well, let's take that sort of as an example. Let's say Federal, ARS, USDA has got an interest and you've got an on-going program or developing an on-going program, let's take the example Dr. Albin used in Lubbock, Texas.

Is there anything today, let's say, that you all talk about that? Is there anything today then that keeps you from going to the private sector and indicating, you know, specific, we're using a cattle feeding industry, is there anything that prevents the two of you either jointly or independently going to the private sector and basically laying out a proposal and saying this is an area of concern we have or are the land grant and nonland grant in California, of doing that, or going to the private sector and laying out a proposal to deal with the problem that is, that they are confronted with?

Mr. KNIPLING. No, there are no constraints or barriers to accomplish that.

Mr. COMBEST. Please.

Mr. ROBINSON. Perhaps, Mr. Chairman, I could add just another couple of thoughts, because the question you've laid on the table is a very critical and interesting one, interesting from the point of view of efficiency, critical from the point of view of funding. If new money is always coming to the system, you can build capacities on all areas in every State and continue to build good, scientific competence. When money becomes tight, questions begin to arise about similarities across State boundaries.

And in fact, the system itself has begun to recognize this. In the Northeast region, for example, they are moving toward a cross state expertise and poultry industry which is very important industry to the Northeast.

Similarly, in the Midwest there are universities that are beginning to form consortia to try to work towards specific cross State boundary issues. Those currently are very important and the discussions are continuing in dairy and in pork. And you find those beginning to emerge and from USDA's point of view, not that we would ever necessarily replace the land grant institution or argue for its replacement, because it serves a lot of clientele, the bulk of the funding as Dr. Dutson points out, comes from the State level or from private sources.

Mr. COMBEST. But what is it that the Federal can do to leverage an increased efficiency by looking at specialization within regions? One State land grant university might specialize in poultry and serve others and a particular segment of that science. But there may also need to be, for example, extension poultry folks in each State in order to be able to transfer that technology to the users.

A similar kind of question could arise with dairy. So the question that you're laying on the table is one that the system is really discussing now as it tries to form some of these consortia to address common regional needs. I think we're there, we're at that investigation, as you referred to earlier, point that we've got to try to look at what can we do to maximize and utilize the efficiency and at the point Dr. Dutson, it may have been you that brought this up, about what impact does that have on other funding, not only from the State, but private. I know the land grant university and I need to make this very clear so there's not any misunderstanding. My home is Lubbock, Texas. Texas Tech University is in my district. However, I am a graduate of a branch of the Texas A&M system which is also in my district so this is not something we've got a parochial interest in, but it's just an interest in overall.

I happen to know that Texas A&M has a very strong group of supporters of that university financially. So does Tech. But if you lose that connection and you lose that ability and tie, I think it is critical that we understand since it's one for five, the Federal portion of that, how much of an impact is that going to have? It may be more detrimental. It may not be in the overall question of research the best approach to take.

I am familiar with some universities in the Midwest that are doing this cooperative effort and I think that is a phenomenal step in the right direction because you're utilizing, you're not cutting off your sources, but you're utilizing some expertise that others may have. And I hope that that becomes to be the norm rather than the exception and I think not only across States, but you take, we're closer to several other universities in Lubbock than we are to Texas A&M so we are miles and miles apart and I think that's important within those that they begin to utilize other facilities and expertise which may be available in an area. Dr. Dutson, that you have mentioned. You've got areas that you've got to concentrate on.

There may be other resources there that are totally nonassociated with the land grant university, but of which could be more efficiently utilized to try to get to the problem you're trying to solve. And these are things I don't think maybe has happened in the past, not by intent, but that maybe forced to happen in the future because we are becoming more constrained and I do hope that those discussions are going on and I think they can be very helpful to us in solving some of our long-range problems.

Mr. DUTSON. I couldn't agree with you more. There are other partners besides the AASCARR institutions, the community colleges, for example, have expertise. And we need to look at how we can cooperate with those.

Let me give you an example of something that we're doing in the Pacific Northwest. We are creating an agricultural degree, the first agricultural degree that we're going to deliver through the community college system is general agriculture. That degree program will be tested this fall at two local community colleges, one, Treasure Valley Community College which is on the Idaho-Oregon border and Blue Mountain Community College which is close to the border between Washington and Oregon. Both of those community colleges are in Oregon.

We have a cooperative agreement developed between the University of Idaho, Washington State University, Oregon State University, Eastern Oregon University which is part of the system of higher education in Oregon where we have some Oregon State University faculty in residence there that develop and deliver an agriculture program there and Blue Mountain Community College and Treasure Valley Community College.

This consortium and memorandum of agreement describes how many courses will come from Washington State University, how many courses will come from University of Idaho, how many from Oregon State University and how many from Eastern Oregon University. Some of these courses are distance delivery. Some of these courses will be delivered through our extension agents who are in those local areas. We have research stations in both of those areas. Some of the faculty at our research stations will participate in delivering some of these courses and the faculty at the community colleges will also deliver some of those programs.

So essentially Eastern Oregon University which is a nonland grant university within Oregon system of higher education, two community colleges and three land grant universities are cooperating together to deliver the programs that are germane in those areas to those students who need training in those areas.

And I think we're beginning to look at these kind of programs in many different ways than we used to before. Twenty years ago, that would be unheard of for us to cooperate in that way across State lines as well as among other institutions and it's not easy. It's difficult, because we've had to deal with the Registrar's Office in all of those institutions.

We have had to change the culture of the registrars in deciding how to sign up these students. We've also had to change the culture of the financial aid departments in all of these universities in these community colleges because they don't know how to deal with different kinds of systems. So it's not easy, but it's something that we cannot stand back and not continue to develop these.

Mr. COMBEST. And I commend you for that and I recognize there's inherent problems that are built into that, but just today's technology almost dictates that that's going to occur.

Mr. Dooley, did you have a comment?

Mr. DOOLEY. I'd like to speak specifically to how I think the Department can encourage those kinds of programs and I think a good example is the RFP that the Department put out on the research portion of the Fund for Rural America which made it clear that they wanted to encourage multi-institutional and multi-functional, multi-State kinds of proposals and Bob can speak more specifically to the number of proposals, but I know of many that there was a citrus research proposal put together that was a California, Texas, Florida proposal that involved four or five institutions, private organizations in each of those States and it was a collaborative effort that was benefitting the citrus regions of the country on a common problem.

I think if the Department is encouraged and as a matter of policy particularly where they have competitive grant programs to where possible look for multi-institutional, multi-discipline kinds of proposals, they'll get them because people, to some extent the proposals follow the money and if the money is targeted to some extent where appropriate to those kinds of multiple institution efforts, it will happen and I think it should be encouraged and I think the experience with proposals received on the research portion of the Fund for Rural America is a good example, that there's a willingness on the part of the scientific community to respond in that way and oftentimes in collaboration with private industry as well.

Mr. DOOLEY of California. I guess again approaching this from, if you could start from scratch here, I think we're looking again at maximizing the investment and a lot of us would in some cases think that do we need how much more bricks and mortar do we need? How do you balance that investment versus human resources potential there.

I guess if you're, I'm wondering even, we have ARS which is, which we refer to basically as your intramural versus the CSREE, whatever you are, that's intermural. Those lines don't always seem quite as distinct to me. But I'm wondering if you started from ground zero, why wouldn't we be developing a system where ARS would be even working to a much closer with the land grants and even the nonland grants?

Why do we almost appear as if we have a separate infrastructure set up that isn't necessarily maximizing the total societal investments in research capacity, why shouldn't we, if we were starting again from scratch, would we do this and why don't we merge and try to create a system where we're merging more the functions of ARS in with our higher institution, educational institutions.

Mr. KNIPLING. Well, I'd like to respond to that. Actually, I don't think we do have separate systems and if there is a perception we do, I think it's been our failure to communicate well the different aspects and attributes of the system. Seventy percent of the ARS laboratories are located, co-located with the land grants.

There are probably a half a dozen examples of nonland grant institution co-location as well. So I think, in fact, our infrastructure in reality is one and the same. Obviously, there is some institutional lines and ownership interest and so forth.

I've been thinking about this conversation for the last 20 or 30 minutes and by and large since it's dealt with formula funds it's not an issue that ARS deals directly with, but in my own mind I've drawn a parallel. In fact, we have developed an evaluation system that has three key elements and that's capacity, relevance and impact and I think those three concepts apply broadly to everything that this system represents. I think the capacity is the foundation of the system and that's reflected in both human resources mainly and physical resources. The physical resources are sometimes the things we see, the monuments, but the real capacity is the human resource, the technical expertise that we maintain.

I think the relevance gets to the issue of are we working on the real problems or are we working on what the stakeholders and the customers need and what the Nation needs and I think the impact gets to the issue of quality and I think that maybe we need to get together, people on this panel and the different components of the system and convey in a different way a more effective way than we've done in the past, how we, in fact, are although we're different institutions, how we're collectively addressing those three concepts. I think in fact, we are doing that very effectively.

I would say further, if we were to wipe the slate clean and start over, I would suspect that we would come up with something very much like we have now. In other words, if we didn't exist, I think we need to be invested. There obviously would be some variations in the formula or the number of laboratories at certain places, but I would venture to guess that we're on the right track. I think sometimes we're spending more energy tweaking the system than getting on with the job that needs to be done.

Mr. COMBEST. I just would be interested in Dr. Albin and Dr. Dutson, I mean, do you see any, again, from our perspective, our charge is basically again how do we make, structure the system so that it can be most efficient, most effective and when we look at ARS, cooperating with land grants, nonland grants, is there anything we can be doing better there?

Mr. DUTSON. Well, I think the introduction to the committee relative to one of the problems that we're dealing with all of what we're talking about and that's the level of funding, but that aside it seems to me the cooperation at the local level is quite good and the collaboration and linkage between the stakeholder community, the university community and the ARS community in those local areas is quite good. I think the establishment of the AREE advisory board, is that how you'd say that?

Mr. DOOLEY. I haven't even attempted to pronounce it.

Mr. ALBIN. But the establishment of the advisory board which I think can help us at the national level to make certain that we are going forward with requests for fundings that are together and the funding requests that go up through the President on the Executive side and the requests that go to the Appropriations Committee which come a lot from the stakeholders and some from our offices, I think this committee can help us make sure that those are in sync and in concert with each other and I think all of us as partners in that would like to see that continue, but I think this advisory board should have the flexibility and the opportunity to bring together various task forces and subcommittees which will allow us to continue to move forward in that direction.

I can see, since I came into the system, a lot of progress in that direction, but I think we need to continue that progress, but it essentially comes down to we really have a lot greater need than we have the funding, so I think we need to establish our mechanisms at the national level for the funding and if that is coordinated sufficiently, I don't see any problem at the local level for the cooperation among the programs because we're all linked with the stakeholders at that level and I think that's the important part of the puzzle.

Mr. ALBIN. Mr. Chairman, Mr. Dooley, I would like to comment that I guess my major concern underlying the discussion this morning is that there's something wrong with the system and that we need to maybe start from ground zero and redo it.

I would disagree with that because we're here today as a well fed Nation and we export a tremendous amount of goods, because we do have the land grant system and all that it embodies and ARS. It seems to me that the issue is how do we adjust to the changing times and the changing pressures from the stakeholders and those persons in private sector to meet the needs that are out there, for whatever reason, but mainly it's a changed ballgame.

And so it seems to me that the very issue of base funding as provided through the mechanisms currently in place is so critical to providing the research infrastructure to allow us to adjust and to adapt to these changing needs.

The very issue of the land grant, the nonland grant position as represented by AASCARR today is that we are receiving the same pressures that the land grants are receiving from the stakeholders and individual interest in that they see needs, they have needs and they're not being met by the land grants.

Well, we have no resources as a nonland grant group either and so the issue is for the nonland grants to become a player in the system in order to meet the needs and this morning my testimony and my remarks I hope have emphasized the need for partnership and collaboration to minimize duplication and to maximize efficiency.

And so the very dialogue that's going on, it seems to me, Mr. Dooley, and the way to get to the answer, is the dialogue because it's new for all of us and for yourselves as well.

Mr. COMBEST. Questioning the system doesn't mean that we're going to change the system. It doesn't mean that we're certainly going to change the parts that are working, unfortunately, Government many times goes on and never questions the system.

That's, I think, we've made it clear our intent is to maximize the dollars expended, the efficiency, but simply questioning it does not mean that it is going to change, but it does provide the opportunity for people to iterate or reiterate how significant they feel that change needs to be or does not need to take place and that's what this hearing is—and others will be intended to do and as with all hearings there may be other questions that arise either from this hearing, or others that we may bring up that we might like your input on. We would solicit that voluntarily or we may request it of you and try not to be burdensome in that regard.

But I would invite you as we go through and as we go forward to make continuing comments as you would because the more open the record is and the more diverse it is, the better opportunity we will have to make sure all views are number one, heard and secondly, our final decision is one which is hopefully correct.

I would again express my appreciation to all of you for coming and I appreciate, this has been quite a lengthy period of time that you've been sitting there and I appreciate your patience and your information.

Thank you very much.

[Whereupon, at 12:35 p.m., the subcommitte was adjourned, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

STATEMENT OF DR. BOB ROBINSON, ADMINISTRATOR COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Thank you Mr. Chairman. I am here today at the request of Secretary Glickman, who recently asked me to represent the Department of Agriculture as the lead policy official for purposes of the research title reauthorization under consideration by this subcommittee. I also serve as the Administrator of the Cooperative State Research, Education, and Extension Service (CSREES) at the United States Department of Agriculture (USDA).

The subject of these hearings—the reauthorization of the Research Title of the Federal Agricultural Improvement and Reform Act of 1996 (the FAIR Act)—is very important to the future of the Department of Agriculture. In the context of last year's FAIR Act, science and education provide a fundamental element of the new safety net for American agriculture and its farmers and ranchers. We take that responsibility very seriously Mr. Chairman, as we have examined options for the reauthorization of the Research Title of the 1996 FAIR Act, we have been working within a framework as follows:

We support maintaining world leadership in agricultural science and education as the guiding principle that undergirds this framework.

We strongly prefer using existing legislative and administrative authorities rather than creating new mandates.

We encourage efficiencies throughout the research system to assure the best use of program resources and to reduce duplication of effort.

We encourage multi-functional, multi-state, multi-institutional activities to achieve maximum leverage of Federal, State, and local dollars.

We will continue to support the range of funding mechanisms and the current structure of intramural and extramural research with improved accountability. We must maintain long-term, high risk research as well as shorter term, investigator initiated research.

Formula funds will continue to play an essential role in maintaining research and extension activities at the Land Grant universities.

The administration supports merit review with peer evaluation in all research programs with competitively awarded programs wherever possible and appropriate.

We value an active Federal-State-local partnership in setting priorities, conducting the work, and evaluating the results. We will work in partnership with Federal, State, and local entities where we have concurrent jurisdiction.

We value public sector-private sector partnerships as a means of leveraging scarce Federal dollars. We respect that the public and private sectors clearly have complementary strengths and we seek to capitalize on those strengths. Public sector activities should focus on that which is in the public interest.

We believe that responsiveness to national and regional needs is a high priority in setting priorities with partners and stakeholders, conducting work, evaluating results, and serving our customers and stakeholders.

111Mr. Chairman, from this framework, we have developed four principles around which we are currently developing a legislative proposal for consideration by this Subcommittee at the hearing you have scheduled for July 16.

1. The Department of Agriculture and the Research, Education and Economics mission area invest in creating and strengthening the research and educational capacity essential to meeting national goals for the food and agricultural system.

2. The programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.

3. The Federal Government has a distinct role to play in partnership with State and local governments and the private sector.

4. Wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as diverse institutions performing research, education and extension.

Mr. Chairman, let me emphasize this fourth point. We strongly believe that a wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as diverse institutions performing research, education and extension. Our hearing today highlights the diversity of performers in agricultural research.

USDA's portfolio currently contains extramural funding in the form of formula funds, targetted grants, and competitive grants in addition to intramural funding. The administration also recognizes that diversity among the institutions performing research, education, and extension is critical to ensuring that national goals are effectively met. A diversity of performers fosters creativity and innovation. It increases the number of perspectives on a problem, enriches competition among proposals, and induces competition to support the best work among entities providing funding, both public and private. Diverse funding alternatives give original ideas a better chance to find support than a more centralized system. As a result, a diverse system enhances quality of output and strengthens national capacity to respond to new opportunities and changing national needs.

The administration supports USDA's mix of extramural programs in research, education, and extension, and is a proponent that formula or base program awards should allow and support maximum flexibility for States to use resources where they have the greatest ability to solve problems. The administration also supports a strong Federal role in leveraging resources, and recent program efforts have emphasized multi-State, multi-institutional collaborations.

Represented here today are the two agencies which together advance the goals of the Department's research program—CSREES is engaged in extramural agricultural research and the Agricultural Research Service (ARS) is engaged in intramural agricultural research.

The mission of CSREES is to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and extension programs in food, agricultural, and related sciences in partnership with both the public and private sectors.

In carrying out this mission, we cooperate with the 59 State and Territorial Agricultural Experiment Stations, the 17 1890 land-grant institutions, including Tuskegee University, the 63 Forestry Schools, the 27 Colleges of Veterinary Medicine in the United States, 42 Schools of Home Economics and the 29 1994 Institutions. In addition to its Land-Grant partners, CSREES has partners through our competitive programs in virtually all segments of the agricultural community including private and public colleges and universities, Federal laboratories, private industry, State and local governments, and private individuals. As one of our State partners furthering the mission of agricultural extramural research, Dr. Dutson from Oregon State University will be talking about the role of the Land Grant Universities. I would be happy to answer any questions you may have from the Federal perspective. The intramural research mission at USDA is carried out by the Agricultural Research Service (ARS). The mission of the ARS is similar to that of CSREES in that it primarily conducts long-term, high-risk research, but ARS also serves the needs of the action and regulatory agencies within USDA by conducting research to develop and transfer solutions to agricultural problems of high national priority.

We look forward to the coming important debate about the future of the research, education, and extension system, and we look forward to working with you and members of the committee to strengthen the capacity of the research, education, and extension system. At this time, I would like to introduce Dr. Ed Knipling, the Acting Administrator of the ARS, to present his testimony regarding the very important intramural work performed by the ARS.

STATEMENT OF DR. EDWARD B. KNIPLING, ACTING ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman, and distinguished members of the Subcommittee, I am Dr. Edward B. Knipling, Acting Administrator of the Agricultural Research Service (ARS). I am very pleased to have the opportunity to submit testimony for the record and answer questions regarding the mission, roles, and direction of the United States Department of Agriculture's (USDA) intramural research programs.

ARS MISSION

The mission of ARS is to conduct research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to:

oensure high-quality, safe food, and other agricultural productsoassess the nutritional needs of Americansosustain a competitive agricultural economyoenhance the natural resource base and the environment, andoprovide economic opportunities for rural citizens, communities, and society as a whole.

ARS ROLES AND RESPONSIBILITIES

In addition to conducting in-house agricultural research that broadly supports the production and utilization of U.S. agricultural commodities and helps to ensure food and environmental quality for the public, ARS fulfills special roles and responsibilities such as: (1) providing research support to Federal action and regulatory agencies, (2) maintaining the technical capacity to respond rapidly to national emergencies, and (3) facilitating the commercialization of new technologies arising from Federal research. These are roles that other public and private institutions cannot or will not carry out because of different missions, costs involved, need for unique facilities, lack of a national network, requirement for long-term resource commitments, and/or the general inability to capture economic benefits that are directly accruing to the public good.

I would like to elaborate on several of the stated responsibilities of the ARS. First, we provide technical support to other Federal agencies to ensure that their policies and programs are based on sound science. ARS teams with agencies having program delivery responsibilities in such areas as food safety, water quality, pest management, human nutrition, and market quality and works with them joint priority setting and technology transfer activities. Examples within USDA include food safety diagnostics and preventive technologies for the Food Safety and Inspection Service, erosion prediction capabilities for the Natural Resources Conservation Service (NRCS), pest detection and control technologies for the Animal and Plant Health Inspection Service (APHIS), diet-health guidelines for the Food, Nutrition and Consumer Services mission area, and market quality expertise for the Foreign Agricultural Service.

Another important example of this role is the research support ARS provides to non-USDA Federal agencies, such as development of alternative methods for pest control, assessment of biotechnology risks, and provision of food composition data for the Environmental Protection Agency. It is important to note that when Federal action and regulatory agencies such as APHIS are involved in international technical and policy negotiations, foreign governments often will not honor the credibility of scientific data and analyses unless it has been generated from U.S. government scientists and laboratories.

The second role I would like to highlight is ARS' capacity to respond rapidly to national technical emergencies and research needs. One examples is the 1993 E. coli outbreak that was rapidly and effectively addressed by mobilizing relevant scientific resources at multiple USDA laboratories nationwide. Development of the rapid bacterial diagnostic test for generic E. coli bacteria by the ARS research laboratory in Clay Center, Nebraska, will assist in the establishment of food quality control strategies by industry and Government for meat inspection. A second example is the detection of fungal spores of Karnal Bunt (KB) disease, discovered last year for the first time in the southwestern U.S. during an inspection of certified durum wheat seed. ARS scientists provided emergency diagnostic services and rapidly put new research in place to help prevent the spread of KB by developing improved identification and decontamination methods and evaluating genetic resistance in wheat.

The third ARS role that I would like to briefly highlight is our leadership in collaborating with private sector industries to transfer and speed the commercialization of research into practical products, processes, services, and businesses. One important mechanism we use is the patenting and licensing of ARS-developed technologies. Protecting private sector investment in further product development and commercialization encourages early technology adoption. Another important mechanism ARS uses is Cooperative Research and Development Agreements (CRADAs). Dr. Peter Johnsen of the National Center for Agricultural Utilization Research in Peoria, Illinois will testify before this subcommittee tomorrow to discuss these public-private partnerships in some detail but I would like to cite just a few statistics. To date, ARS has entered into nearly 700 CRADAs. ARS leads the Federal research sector in the number of these public-private sector collaborations. Approximately 200 patent licenses are currently in place with the private sector to further develop ARS-developed technologies into commercial products and services.

ARS technology transfer has had an especially positive impact on small and rural businesses. More than half of ARS' current licenses and CRADAs are with small, rural, and/or minority-or woman-owned businesses. At least 48 small and/or rural companies have been created based on patented ARS technologies.

STRATEGIC PLANNING AND PRIORITY SETTING

The ARS mission and roles support the five strategic goals and outcomes of the overall Research, Education, and Economics (REE) mission area which are: (1) an agricultural system that is highly competitive in the global economy; (2) a safe and secure food and fiber system; (3) healthy, well-nourished children, youth and families; (4) greater harmony between agriculture and the environment; and (5) enhanced economic opportunity and quality of life for citizens and communities.

Since 1983, ARS has developed a series of multi-year strategic plans that identify the most critical research programs in the national interest within the scope of our mission and resource capacity. The current plan reflects the REE goals, the purposes of research outlined in the Federal Agricultural Improvement and Reform (FAIR) Act of 1996, and the requirements of the Government Performance and Results Act (GPRA) of 1993.

The research directions and priorities outlined in the ARS strategic plan also reflect the input from a broad spectrum of the ARS customers and stakeholders. These include administration officials, Congress, Federal action and regulatory agencies, farmers and ranchers, commodity groups and other farm organizations, corporate entities, trade organizations, small businesses, environmental and consumer groups, the scientific community, and many others.

ARS uses a broad spectrum of both formal and informal mechanisms on an ongoing basis to receive the research needs and priorities of customers and stakeholders. We meet regularly with officials of various organizations, many of which have established research advisory committees or have designated special representatives for this purpose. Other mechanisms include formal meetings and conferences. For example, in 1995, ARS undertook an extensive outreach effort to gain input from a broad cross section of the agency's customers, stakeholders and partners. Five regional Visioning Conferences brought together between 350 and 400 participants who identified major issues that affect agricultural research and major priorities for future ARS research. In March of this year, ARS received the output and benefit of a stakeholder symposium sponsored by the new REE Advisory Board authorized by the FAIR Act of 1996.

ARS PEER REVIEW PROCESSES

Peer review of ARS research is critically important to the credible and accountable implementation of our strategic plans. ARS utilizes multiple peer review processes, both prospective and retrospective, to help us measure and judge research relevance and quality. These reviews are aimed at individual scientist achievements, individual research projects, scientific manuscripts, laboratory programs and national programs.

ARS carries out a formal peer process to retrospectively evaluate the quality of scientists' accomplishments and stature, as a basis for their professional advancement. Factors included in this review are published or other documented science accomplishments, technological impacts on problem solving and customer needs, honors and awards, professional activities, and other examples of scientific impact and recognition. Panels operate in a confidential manner and do not include supervisors or subordinates of the scientist under review. As a result, the ARS system remains highly objective and credible. This system fosters scientific excellence and professional advancement which are important measures of research quality and relevance.

In addition to a focus on individual scientific achievement, ARS policy requires each new research proposal to undergo a prospective merit and relevance review. A project usually represents the research of a small team of ARS scientists at the same laboratory for a 3 to 5 year period aimed at a specific problem or objective. The reviewers include both ARS scientists and non-ARS personnel. The latter include customers and stakeholders to insure the research relevance of a proposed new research project. Approximately 200 research projects, or 20 percent of the entire ARS program, are reviewed each year in this process.

All scientific manuscripts arising from research projects are required to undergo an internal and external quality review prior to submission to a scientific journal. Each manuscript must be reviewed by at least two subject matter experts in the field: one ARS scientist external to the laboratory and one scientist external to ARS. Review comments must be considered by the authors before the manuscripts are submitted for publication. Journal officials in turn require manuscripts to undergo additional external peer review for validation of their scientific quality.

Ongoing research programs are reviewed periodically at the laboratory and national levels. These reviews consider the accomplishments of multiple individual projects which are components of a larger national program. Reviewers are ARS scientific managers, peer scientists from outside ARS, and representatives from industry, agricultural interest groups, and other customers and stakeholders. Review criteria include excellence, relevance and management standards. Information from these reviews provide a foundation for continual adjustment in the Agency's programs and individual research projects, including prioritization of programs and projects and allocations of fiscal and human resources.

ARS FACILITIES

ARS maintains a network of facilities at more than 100 locations to conduct fundamental and applied research of national or regional scope on agricultural production, food quality, and environmental problems and issues. Limited resources require that federally funded agricultural research facilities reflect national priorities and be capable of world-class research. The FAIR Act of 1996 authorized a Strategic Planning Task Force to review agricultural research facilities built with Federal dollars, recognizing the need to maintain a future comprehensive capacity to carry out quality research on national priorities. The Task Force had their first meeting May 28–30, 1997, in Ames, Iowa, to begin its important work to evaluate existing federally funded agricultural research facilities in ARS, the Forest Service, and at Land Grant Universities and to develop a ten-year strategic plan to guide future Federal investments related to facilities.

The co-location of ARS laboratories at Land Grant Universities and other cooperating institutions is an important attribute of the United States public agricultural research system. Co-location has many benefits, including: —mutual interests are addressed in a cooperative, coordinated, and complementary manner;—resource use is optimized; and—ARS scientists assist in the education of future scientists by serving as research advisors to graduate students and providing employment opportunities and further training for post doctoral students. There are, however, many instances when the public and other customer needs and benefits require an ARS laboratory to stand alone and be site specific. This applies especially to field-based research programs on conservation, cropping, and livestock production systems in special ecological and climate zones far away from the more densely populated towns and cities where universities tend to be located. For example, ARS has located a network of field laboratories within the Great Plains and western range lands, providing the strategic geographic coverage to address agricultural and environmental issues in diverse ecological zones. In these situations, universities often co-locate some of their scientists at the ARS sites.

CONCLUSION

This testimony provides only a brief overview of the Department's intramural program. ARS research is broad and complex but complements the roles of other important performers in the United States agricultural research system. We are proud of ARS' leadership in the critical problems we investigate. More importantly, our accomplishments and solutions are achieved for a very small investment, just one percent of the total Federal investment in all research and development. Thank you for this opportunity to share with you ARS' role in intramural research.

ROBERT ALBIN, INTERIM DEAN OF THE COLLEGE OF AGRICULTURAL SCIENCES AND NATURAL RESOURCES AT TEXAS TECH UNIVERSITY

SUMMARY

Non-land-grant universities are filling voids and meeting needs in agricultural and natural resources in areas where land-grant universities have exited due to their own shrinking funding base or in areas of States where the historical prioritization for funding of agricultural research did not include that geographical area or need. With opportunity to competitively access Federal funding, non-land-grant universities will be more capably equipped to meet agricultural and natural resources research needs and expectation of stakeholders and the private sector. Non-land-grant universities offer unique capabilities, faculty and programs, that are utilized, and can be more effectively utilized, if allowed to compete for additional Federal funding.

INTRODUCTION

Mr. Chairman and Members of the Committee, I am Robert Albin, Interim Dean of the College of Agricultural Sciences and Natural Resources at Texas Tech University located in Lubbock, Texas. It is my privilege to present testimony to the Committee on Behalf of the American Association of State Colleges of Agriculture and Renewable Resources (AASCARR), addressing the current and future role of research conducted by non-land-grant universities for American agriculture and natural resources. AASCARR is a national organization comprised of more than 50 non-land-grant universities in many States. AASCARR receives no Federal grants or contracts. AASCARR-affiliated universities offer agricultural and natural resources baccalaureate degree programs, several offer master of science degree programs and one, Texas Tech University, offers the doctorate in six disciplinary areas. Graduate education is an important component of these programs. These advanced degree programs require research to be conducted as one of the degree requirements. It is important, therefore to recognize that research conducted at non-land-grant universities also involves graduate education for students who graduate to become productive participants in the various fields of agriculture and natural resources.

JUSTIFICATION and DISCUSSION

It should be noted that this testimony reflects a positive partnership, and collaboration with, land-grant universities. To address the current and future role of non-land-grant universities in conducting research for American agriculture and natural resources, the following statements and examples are presented.

A number of colleges, schools, and departments of agriculture (some with broadened discipline areas) have significant, growing research programs which are usually designed to address problem solving for the agriculture industry. These programs commonly address issues of particular importance to agriculture/forestry in the region of the State where the university is located, but results are applicable to a wider area: statewide, regionally, and nationally. These programs often involve partnering with other institutions, including land-grant universities, private industry and commodity organizations. The latter two groups are often sources of funding for research, and grants are received from a number of public and private sources.

In many less urbanized areas, land-grant programs have been reduced or deleted, generally due to shrinking funds or statewide research priorities that exclude specific areas. This research void creates needs of stakeholders and private industry who approach the non-land-grant university in an area seeking, and expecting, assistance, but find funding is frequently unavailable to address their needs.

Some non-land-grant agriculture programs receive State funds to support their research programs. For example, Texas Tech University receives over $2.0 million and Texas A&M University-Kingsville, and West Texas A&M-Canyon both receive over $1.0 million from the State of Texas for agriculture and natural resources research. California State University-Fresno, is appropriated over $1.0 million from the State of California for research in agricultural sciences and technology. Additionally, Southern Illinois University at Carbondale receives nearly $1 million from the State of Illinois. Illinois State University and Western Illinois Universities also receive substantial State funds. All of these schools are AASCARR universities.

There is a significant pool of human capital at non-land-grant universities. While significant research occurs at the non-land-grant institutions, this opportunity could be greatly enhanced by the broadening of access to Federal funding.

An excellent payback of Federal investment would result from a capacity building, strengthening grant program for AASCARR universities similar to that provided to 1890 land-grant universities and developing for the 1994 land-grant institutions. This would enable non-land grant faculty to become more competitive for Federal grants.

AASCARR would like to see increased appropriations for the Challenge Grant Program. Currently, programs to improve the educational system for agricultural students receive a very small portion of the USDA budget. However, the end product, better education graduates, has a far reaching impact. It is our goal to see the funding for this program reach a minimum level of $ 7 million annually. This would allow additional research and more collaborative efforts.

The following are other issues of particular importance to non-land-grant universities:

The National Agricultural Research , Education, Extension and Economics Advisory Board should be expanded to include representation from the non-land-grant institutions. At the present time, non-land-grant universities have no voice in setting priorities for research, education, and extension programs.

Eligibility to compete for competitive research, extension and education funding.

Emphasis on continuing the Fund for Rural America at the original funding level.

Emphasis on giving priority to proposals that represent partnerships among various entities.

The requirement for stakeholder input on research priorities.

The non-land grant universities represented by AASCARR appreciate very much the opportunity to appear before you today and to present testimony reflecting the current and future role of non-land-grant universities in conducting research for American agriculture. Thank you.

STATEMENT OF THE NATIONAL COTTON COUNCIL

Thank you, Mr. Chairman, for this opportunity to discuss agricultural research. My name is Jimmy Sanford, and I operate our family farm near Prattville, Alabama. Today I am representing the National Cotton Council, the central organization of the entire cotton industry. I am the chairman of the Cotton Council's Industry/Government Research Committee, and the topic of research and education is one that traditionally is among the highest priorities of our organization.

Earlier this year Senator Lugar provided us the opportunity to consider some very appropriate questions concerning the research and extension system in the US. The NCC research committee, which I chair, convened cotton growers representing every Cotton Belt region from the far western States to the East Coast. We developed our response to Senator Lugar's questions. We addressed the roles of the USDA Agricultural Research Service, research conducted by universities, and research addressed by private sector interests. We would like our responses to Senator Lugar to be included as part of the record of this hearing.

Over the years we think that the public and private research system has been generally responsive to our research needs. We attribute that success to the feedback and communications between the industry and those who conduct research.

This morning I will describe some of the key ways that the cotton industry works to communicate our needs, priorities, and objectives and to get feedback from the research and education community. We are strong believers that providing the forum for dialogue and interchange is the most important first step to assure accountability and relevancy.

We consider the public and private research organizations as partners, and as such, we annually work together to provide many opportunities for information exchange. The centerpiece of the cotton educational effort is the annual Beltwide Cotton Conference. The cotton industry in cooperation with the land grant universities and the USDA's ARS has worked for many years to make the Beltwide Conference a comprehensive reporting of research results. In January of this year, over 5,000 farmers, processors, marketers, researchers, educators, consultants, agribusinesses and other representatives convened. The latest findings, whether from public laboratories or agribusiness field plots, were reported in nearly 800 individual presentations. A diversity of topics ranging from environmental benefits of integrated pest management and boll weevil eradication to the investigation into new technologies such as precision agriculture and genetic engineering were presented. Facilitating discussion among the conferees helps to elucidate, though informally, such important issues as relevancy and accountability.

The Beltwide is only one part of the communications process. For example, last fall we convened regional focus sessions among growers, researchers, administrators and extension specialists to identify the most important issues for research. These priorities are being formally communicated to research organizations.

The Council's sister organization, Cotton Incorporated, invests heavily in research. Cotton Incorporated is supported by checkoff funds from US cotton producers and importers of cotton goods. Research funded by Cotton Incorporated is typical of private research in that we can ill afford the long-term, high risk, basic research best conducted by the public sector. In addition to programs directed by the national committees within Cotton Incorporated, every Cotton Belt State has a standing State support committee to review proposals and direct money toward meeting local and State priorities. Interaction with land grant universities and State agricultural experiment stations is integral to the Cotton Incorporated effort; hence, another mechanism for communications and discovery of relevance.

Written communications are also used. Annual publication of proceedings of the Beltwide conferences are made available. In addition to the bound publications, abstracts can be searched in computer data bases developed by our organization. For scientific reporting, the Cotton Foundation is developing in cooperation with the research and education community, a peer reviewed, scientific journal. The quarterly publication will be available electronically via the internet. Again the thrust is to provide every possible mechanism to assure information sharing, prevent unnecessary duplication, and meet needs of all partners.

Finally, the cotton industry invests significant resources in supporting its own foundation for cotton research and education. Programs of the Cotton Foundation are generally directed toward educational and technology transfer. The foundation is funded by agribusiness partners which provides additional linkages to the totality of an agricultural research system.

In conclusion, what I have described is not a single effort, activity, nor committee that will assure effectiveness and efficiency in public research and extension. In contrast, we view this as a smorgasbord of multiple opportunities, facilitated by the partnering of industry, State, government, and agribusiness. Also what I describe doesn't happen by chance. It started with a deep institutional commitment with the fundamental understanding that we all have shared responsibilities for meeting the public's objectives for assuring an adequate, safe, and affordable supply of food and fiber.

TESTIMONY OF DANIEL M. DOOLEY,VICE CHAIRMAN, USDA NATIONAL AGRICULTURAL RESEARCH, EXTENSION, EDUCATION AND ECONOMICS ADVISORY BOARD

Good morning Mr. Chairman and members of the Committee. My name is Dan Dooley. I am Vice Chairman of the USDA National Agricultural Research, Extension, Education and Economics Advisory Board and fill the plant producer category on the Board. I am also a partner with the Ranking Minority Member of this Committee in Dooley Farms, a San Joaquin Valley California diversified farming operation. I serve as a representative of the University of California to the national Council for Agricultural Research, Extension and Teaching where I am a member of the executive committee and the National Secretary.

Dr. Victor L. Lechtenberg, Chair of the Advisory Board and Dean of Agriculture at Purdue University, was unable to be here today. I am pleased to represent the Advisory Board and to share some thoughts with you this morning on legislation that is vital to the continued competitiveness of the American food and fiber production system. Many of my comments include considerable input from Dr. Lechtenberg. Your work, and that of your colleagues will play a central role in charting the future success of the historically unparalleled United States collaborative agricultural research and education system. Refinement and enhancement of the historically successful system to make it more responsive to current needs and focused on long-term objectives should be welcomed by all who participate in or benefit from such work.

In recognition of the press of business confronting this Committee and its members, I will submit my full testimony for the record and simply provide you with a summary at this time. Specifically, I will discuss five issues: 1) the importance of the Federal role in research and education programs; 2) the importance of programmatic research and education agendas, and interdisciplinary, multi functional and regional programs; 3) appropriate partnerships with the private sector; 4) the investment in research, extension and education; and 5) the activities of the Advisory Board, including activities to insure relevance and appropriate stakeholder input into priority establishment.

Important Federal Role in Research, Extension and Education

In the climate of today's budget discussions, many question the appropriateness of spending Federal dollars for research, extension and education at a time when budget deficits are large. However, it is critical to recognize that Federal investment in these programs is essential to the technological competitiveness of our agriculture and food system, to our economic well-being, and for a safe, nutritious, low cost food supply for our citizens. This is particularly true in light of the significant restructuring of American agricultural which will inevitably result from the phasing out of commodity support programs mandated by the 1996 Farm Bill.

(1) Federal funds are appropriate, and needed, to achieve national goals. The U.S. should continue to be a world leader in developing basic, fundamental knowledge as a foundation for the practical and cost competitive food and agricultural systems of the 21st century. Our national policy goals should include being the world leader in both the basic and applied research necessary to fully capture the economic potential--domestic and international--of the nation's food and agricultural system. We have enjoyed this position throughout most of this century. We must not lose it.

(2) Our national policy should also assure the Nation has the best educated and trained human resource base in the world. Maintaining our human resource capital is an essential component to remaining atop the increasingly competitive global marketplace. Our leading land grant universities are recognized around the world for their excellence in education. Students around the globe aspire to study at U.S. land-grant universities. This is a tribute to the wisdom and leadership of the Congress in creating and nurturing this system in past decades. The unique marriage of teaching with research and extension education is a major factor in the prominence and reputation of these institutions. The U.S. should retain this preeminent position.

(3) A significant portion of research carried out at land grants and USDA produces benefits that accrue well beyond State boundaries. These "spill over" benefits are significant, especially in crop and livestock production. USDA sponsored programs at individual and consortiums of land grant institutions for commodity and animal research provide benefits far beyond the states served by the participating institutions. This partnership has provided opportunities for development of technology benefitting nonprogram crops which have national significance because of their importance to the nation's diet or export revenues. The unique nature of this partnership has been at the core of our past successes and will continue to yield rates of return which would be astonishing in the private sector. The partnership must be preserved.

(4) Investments in agricultural research and extension have been shown repeatedly to give economic rates of return of between 30 and 50 percent annually. Returns of this magnitude suggest that the Nation is under invested in such activities. Increased investments would pay off handsomely in future decades by enhancing our base of technology from which we can build a better, more economically secure nation and world for our children and grandchildren.

(5) Some argue that research and education in agriculture can be privatized. While private sector investment in agricultural research has increased in the last decade, the agenda for private research, by necessity, must be driven by a relatively short-term goal of generating profit from the sale of goods and services. An entirely short-term focus would change overall research outcomes significantly. Public sector financed programs can and do step beyond the constraints created when short-term benefits dominate the agenda. Publicly funded programs can address long-term projects of national priority and projects of public benefit. Examples are integrated pest management, soil conservation technologies and many environmental enhancing technologies. Without public funding, these vital, public good technologies are not likely to be developed.

Programmatic, Interdisciplinary, and Multi Functional Research, Extension and Education

Future efficiency and success of the research, education and extension functions require a continued evolution toward programmatic organization and budgeting. National programmatic priorities must be addressed in a coordinated manner which ensures that the best available talent is utilized to achieve research, education and extension objectives. Flexibility must be provided to allow objectives to be achieved based upon quality and efficiency rather than historic agency or institutional alignment.

Currently, the research, education and extension system is organized largely along institutional and agency lines. To some extent the historic institutional and agency alignments have been altered by the reorganization of the USDA programs into the REE mission area and under a single Under Secretary. More should be done to ensure agency and institutional coordination in establishing programmatic priorities and in budgeting for and implementing needed programs.

To the extent practical, the Department of Agriculture should ensure that federally supported and conducted agricultural research, extension, and education is accomplished in a manner which:

(1) integrates agricultural research, extension and education functions with one another so that newly developed technology is commercialized and transferred to new generations by appropriate incorporation into classroom instruction;

(2) comprehensively examine relevant agricultural research, extension, and education needs by applying multiple disciplines in a coordinated manner;

(3) encourage regional and multi State programs to address relevant issues of common concern;

(4) achieve relevant agricultural research, extension, and education objectives through multi institutional and multi functional cooperative programs;

(5) achieve relevant agricultural research, extension, and education objectives in the most efficient manner by conducting such research at the facility[ies] or institution[s] best equipped to achieve the objectives; and

(6) recognizes the importance, and furthers the development, of Federal, State, local and private cooperation and partnerships.

PRIVATE SECTOR PARTNERSHIPS

My experiences as a farmer, Advisory Board member and as CARET representative have convinced me of the need to find innovative ways for the public and private sectors to work more effectively together. However, the research and education community is confronted with a dilemma. On one hand, it must ensure that programs are not branded as corporate welfare. While on the other, it must guard against a disconnect between REE programs and stakeholder needs and relevance.

USDA REE must ensure that new knowledge and technology are developed into useful products, information, and services. To achieve this, effective mechanisms to facilitate collaboration and cooperation between the private and public sector should be encouraged. Requiring Federal, State and private sector co-funding on certain projects or programs would encourage such collaboration and would help ensure that programmatic objectives are achieved in the most efficient manner. However, as mechanisms are designed, they should encourage development of new businesses, grow small businesses, and be open to participation by educational and research institutions of all sizes. Matching industry fund requirements could be targeted to specific projects with an anticipated short path to commercialization, so that industry would have clear incentive to participate. This would ensure 'buy-in' and relevance assessment from important stakeholders.

INVESTMENT IN RESEARCH, EXTENSION AND EDUCATION

The reauthorization of the Farm Bill Research and Extension Title will set the funding landscape for agricultural research, extension and higher education for at least the next decade. Federal funding for agricultural research and extension is about $1.8 billion dollars, only three percent of total appropriations for all Federal research and development. The agriculture and food industry that this research supports is commonly estimated at 15-18 percent of the nation's domestic economic output. Thus, the Federal agricultural investment in agricultural research and extension, relative to the economic value of the industry, is low compared to other sectors of the economy. Additionally, several countries today invest more than twice as much per dollar of agricultural output as the U.S.

Federal appropriations for university programs have generally not kept pace with inflation since 1980. Base (formula) funds, which support core programs at universities in partnership with State and local funds, have declined almost 20 percent. These statistics along with very high annual rates of return, suggest that the U.S. is under funding agricultural research and education. This has occurred during a time when Federal funds for research and development in other areas, have been growing more rapidly than inflation. Agricultural research and education is being short changed.

The Fund For Rural America was established by Congress in the 1996 FAIR Act as an innovative new approach to funding multi disciplinary, multi functional applied research. The possibilities provided by the Fund have caused a swell of optimism from the research and education community. This new funding source holds great promise for the food and agricultural system and rural America. The current legislation, however, contains a sunset clause that will terminate the Fund for Rural America at the end of three years. In order to provide adequate funding for the future needs of rural America, you should consider extending the authorization of this innovative program to the full seven year period covered by the 1996 FAIR Act. As this program develops, linkages among agricultural production, processing and trade issues will be strengthened and expanded. Congress has the opportunity to endorse multi-State joint research, extension and education projects by continuing its commitment to this program.

A balanced funding portfolio that includes base program support, competitive grants and special grants contributes to the strength of the system. Competitive grant programs such as the National Research Initiative are critical funding mechanisms to assure high quality, merit reviewed research particularly for basic research to achieve national priorities and goals. Research to achieve long-term, high priority national or multi-State regional goals should be funded primarily by Federal funds.

Base program funding is important to maintain the cooperative partnership between USDA and Universities and to provide a coordination framework that helps achieve national as well as State and local research and education goals. These funds help sustain the intellectual capacity of the university based agricultural research and education system as well as support the infrastructure necessary to address important national, State, and local issues. Reductions in base program funding would reduce the capacity of the system.

Special grants are an important funding mechanism to address regional and technology directed goals. Unfortunately, due to reductions in core program funding and lower funding in many States, pressures have mounted to use Federal special grant funds to address many State and local goals. While these projects are meritorious, Federal funds would be more wisely invested in multi-State, regional projects and programs and in ways that encouraged effective cooperation among research and education institutions. Some problems of a strictly local nature might be of such national importance to justify Federal funds but these would be rare and would be prime candidates for a matching fund requirement.

ACTIVITIES OF THE ADVISORY BOARD

The USDA National Research, Extension, Education and Economics Advisory Board was created during the 104th Congress, as part of the 1996 Federal Agriculture Improvement and Reform (FAIR) Act. The board is charged to advise the Department of Agriculture and its land-grant partners regarding priorities, expected results, effectiveness and relevancy of programs within the REE mission area. Additionally, the Board is responsible for providing customer input in the formation of the REE Strategic Plan. The board consists of 30 members specified by Congress to represent the broad array of research and education stakeholders.

To date, the Board has provided guidance to the Secretary on a number of different issues, including the Fund for Rural America, the strategic plan and the facilities strategic task force nominees. The Board conducted a Stakeholder Symposium on March 25, 1997, in conjunction with its meeting. The symposium was the first attempt of the Advisory Board to help ensure that broad stakeholder input is incorporated within USDA's priority setting processes. Shortly, the Advisory Board will complete its summary of key issues raised at the Stakeholder Symposium. Additionally, the Advisory Board will be holding a regional stakeholder symposium in July of this year at Columbus, Ohio. This regional conference will be held in conjunction with the North Central region mini land grant meetings. The Advisory Board will be considering an on-going process for stakeholder participation at its August 1997 meeting and is confident that this process will achieve the goals defined by the legislation.

Finally, the Advisory Board has created a working group to review the USDA REE performance plans prepared in compliance with the GPRA requirements. The working group is presently formulating initial comments for the Advisory Board to submit to USDA. Among the issues the working group is evaluating is how the Advisory Board can effectively integrate information acquired through its stakeholder participation process into the USDA performance plan development. The objective of the Advisory Board is to develop a process to help ensure relevance of USDA REE program priorities and initiatives.

CONCLUSION

Agricultural research, extension and education has had an invaluable impact on the development and competitiveness of this country. Its role in the future will be equally, if not more, important. The restructuring of commodity programs, the advent of new technologies, elevating public expectations, and increasing globalization of markets portends a new era for our farmers, ranchers and rural communities.

These realities will require greater reliance on new technologies and management strategies backed by strong research and education programs. USDA REE programs will pay handsome dividends in terms of the future economic health of the agricultural industry and the nation. Regardless of budget allocations, we must do all we can to assure U.S. farmers and producers always enjoy the world-leading technology to which they have become accustomed, and that American consumers continue to enjoy the safest, most nutritious and least costly food in the world. Members of the Advisory Board and I stand ready to work with the committee in charting a path to the next century through a strong and improved research and education system.

STATEMENT OF ELIZABETH D. OWENS, PH.D., MEMBER OF THE GOVERNING BOARD, ARI

Mr. Chairman my name is Elizabeth D. Owens. I'm Manager for Government Affairs for ISK Biosciences Corporation, a major provider of inputs for agriculture. I am also a member of the Governing Board of the Agricultural Research Institute. Today I'm accompanied by Dr. Richard Herrett, Executive Director representing ARI. ARI is a non-profit organization which brings together members from the for-profit industry, academia, government and the non-profit private sector. Its primary mission is to facilitate the exchange of ideas on present and future needs in agriculture by conducting forums and symposia on major issues, by facilitating interaction among academia, government and industry leaders, and the implementation of projects of interest to its members. ARI takes the position that Federal funding of agricultural research provides leadership that results in funding commitments from other sources including States, industry, private foundations and production sectors. The relatively small input by the Federal Government leads to a mix of funding sources thus providing increased stability for the continued support of an affordable, healthy, environmentally and economically sustainable food and fiber production system.

In my comments today, I will present a prospective of the for-profit private sector. While I'm currently employed in the crop protection industry, my experience also includes the biotech industry, academia and the IPM services industry. I am an entomologist by training with a number of years in IPM research.

Before proceeding, Mr. Chairman, I wish to thank you, the other members of the s Subcommittee and the members of the Agriculture Committee for their diligence and time spent in the reauthorization of the Research Title of the Farm Bill. I believe this could be one of the most significant deliberations of the 105th Congress as it could certainly impact the long term competitiveness and economic viability of America's number one industry

In a May 1995 ERS report (staff paper 9510), it was estimated that in 1992 the private sector provided approximately 60% of funding for agricultural research, much of which went directly into industry in-house research on farm chemicals (37%) and processed food products (30%). I think this supports my basic premise that the public and private sector spending in research and development isn't duplicative and that industry's focus is on research is directed toward product development. Industry relies on the university system, including extension and regional experiment stations, and the USDA, to characterize the problems, provide basic information on the situation and ideas for solutions.

In the case of crop protection products, it is the responsibility of industry researchers to take publicly and privately generated knowledge and ideas and turn them into profitable, marketable products that effectively eliminate or minimize the problem for the farmer. The goal of the for-profit industry is to develop a product that farmers will want to purchase because it adds significantly to the farmer's bottom line. My current employer manufactures and markets fungicide. It costs the company roughly $100 million plus, from laboratory discovery and screening to production, to bring a new fungicide to the growers. This product has to work for those growers or they won't buy it a second time. If they don't become repeat buyers, then we haven't invested in a successful product. Applied, focused research based on sound scientific information from the public sector is a bottom line effort for us.

There are not always going to be profitable, marketable products available for the solution of every problem so sometimes public research results in publicly funded programs that provide a solution. Public funded research is also viewed by the public as less biased, more neutral than that funded by private industry. Thus Federal funding is often required for research that supports Federal laws, regulations, or policy decisions. The Federal Government also must lead where large scale adoption of one or possibly several new technologies is needed to solve a problem. Large, regional projects that require coordination across State lines and between Federal, State and private industry are good examples of such leadership. In this later category eradication of the bollweevil is an excellent example of a successful program.

In the 1960's prior to the implementation of this program, cotton production was virtually eliminated from Southeastern USA because of the costs associated with bollweevil control. Today, following the success of the USDA led bollweevil eradication program several million acres of profitable cotton are harvested there annually.

The resolution of specific agricultural problems often times requires a complex series of interactions between various organizations both private and public, multidisciplinary interactions in many various departments or agencies within a single organizations. I've attempted to illustrate those complex interactions as they relate to the solution of single disease affecting potatoes (Figure 1).

When one considers that well over 250 different crops are grown commercially in the United States and each has its own set of unique set of disease, pest and weed problems, it becomes evident why such a complex is necessary. Indeed the information represented by this chart is the envy of the world for it is this infrastructure which results in solutions to problems affecting agriculture. To illustrate how the profit motive drives decisions in the private sector research, we can examine grain production. When corn was hybridized in the 1930's, it suddenly became possible to develop a private industry based on supplying corn seed because it was profitable for the farmer to grow hybridized varieties and he had to keep going back to the source for more product. In the case of wheat, which can not be easily hybridized because it is self-fertile, most of the product development has remained in the public sector. Wheat farmers can save seed for plant back because the variety will remain true. Only a limited commercial industry exists for wheat seed which provides introduction of some new public varieties or seed pretreated with pesticides. To illustrate how unprofitable wheat seed is compared to corn seed, Pioneer Hi-Bred International, Inc. made a gift of its wheat variety development program to the States. This does not mean that wheat is unprofitable for farmers to grow or that its production does not have continuing problems that justify wheat breeding programs (e.g. Russian Wheat Aphid and Karnal Bunt). It just means that the profit margin for the commercial sector does not justify their continued support of internal product research and development programs.

The time frame from discovery to product development is important. Private industry will step in and do the research if they see that the time frame from investment to return is relatively short, but it is to the benefit of society for the public to fund those long term, basic research projects which have potential for significant pay off, but for which risks are high and success is not assured. A case in point is, genetic engineered crop plants. The potential for this technology became apparent in the 1950's when Watson and Crick described the molecules holding the genetic code. It wasn't until genes were cloned 20 years later that industry became interested in possible commercial applications. Industry really didn't get involved to any significant degree until the mid eighties, after significant progress had been made in the development of technology for the identification, isolation, cloning, and transfer of individual genes. 1997 is the first year of significant commercial planting of genetically engineered seed, roughly 30 million acres. So that's 50 years from discovery to commercial application with significant industry involvement only in the latter technology development phases and once commercial viability was relatively certain.

Today, the USDA has another opportunity to provide leadership in basic research - the Plant Genome Project. This initiative provides several elements that fit the image ARI has for a federally based program. It has a broad scope, encompassing a number of basic research areas, crossing disciplines and agencies and incorporating public/private sector interests. It is a long range, high risk project, but with potentially very big payoffs for the general citizenry. For agriculture, it could lead to improved crop varieties and plant health products that will enhance environmentally sustainable production. It will also lead to basic discoveries about the nature of genetics and the genetic code that will benefit medical research for both human and animal health. In that respect, it is very comparable and complimentary to the Human Genome Project. Support for this initiative could lead the USDA to exciting new discoveries and enable them to build a center of excellence in basic science research.

Finally, I recognize that the Federal Government conducts agricultural research that is important to private business and Federal regulatory agencies that is economic in nature. I would like to present two examples that are of particular importance, the USDA food consumption survey and agriculture production statistics. The food consumption survey is particularly significant to Federal regulators, the crop protection industry, the food production industry and food processors for two reasons: 1) EPA is currently conducting pesticide residue risk assessments on data that is over twenty years old, meaning that the results of these risk assessments might not be relevant to today's consumers, and 2) the 1996 Food Quality Protection Act (FQPA) specifically requires the Agency to make risk assessments for youth populations for which currently no valid consumption data exists. It is extremely important to the implementation of FQPA that the Continuing Survey of Food Intake by Individuals (CFSII), including the enlarged survey of consumption by infants and children be fully funded on the timetable and budget of $6.0 million as proposed by USDA. Just this month, the Scientific Advisory Panel (SAP) for the Office of Pesticide Programs at EPA noted the lack of current data on food consumption is a significant weakness in EPA's proposed methods of determining dietary risks from use of pesticides. The SAP is composed of accomplished scientists from academia, private research laboratories, and government agencies who provide a peer review of EPA's science based policies.

An additional requirement for implementation of the FQPA is surveillance of pesticide residues on food items, particularly those consumed by children. USDA has requested $10.2 million for funding of the Pesticide Data Program (PDP) to accomplish this. This data will be useful to EPA as it will provide reality data to support residue level assumptions used in dietary risk assessments for re-evaluations of tolerances on registered pesticide products.

Agriculture production statistics are important to a wide variety of private industries which use the data in market analysis for justifying research and development costs associated with proposed services and products. Since agriculture is now a global industry, information compiled on the production and consumption patterns of countries throughout the world helps US industries stay competitive.

In summary, thank you again for this opportunity to represent ARI as you begin these critically important deliberations regarding the Research Title to the Farm Bill. ARI is a strong supporter of the public funding of agricultural research at or above the current level by the Federal Government. The benefits generated for the US citizenry from the research, extension and education programs in agriculture underpin an economy that is the envy of the world. Yet, the politicians in Washington barely notice expenditures on agricultural research among research budget giants such as defense ($35 billion) and health ($12 billion). Now, more than ever, in an increasingly competitive global economy, it is important for members of Congress revising the Federal commitment to research, to understand the importance of maintaining leadership in research based technology for the food system. It is well documented that when Federal funding for basic research declines, the funding from other sources, including the private sector, also declines in due course. Public sector funding must lead the way if the Freedom to Farm Act and the Food Quality Protection Act are to be implemented with the results Congress intended; that is a public satisfied that their safe, affordable food supply is produced in an environmentally and economically sustainable fashion.

Figure 1: Simplified flow chart of the types of research conducted by various publicly and privately funded organizations and the research results which were directly related to the original goal of controlling potato net necrosis. It is not possible, in this simple graphic, to represent all of the complex interactions between the various research sectors and funded projects. The graph roughly represents research from 1940 to the present, with most of the work occurring from the late 1950's onward.

STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION

Thank you for the opportunity to share with the Subcommittee information about how the American Farm Bureau Federation uses private dollars to conduct agricultural research.

The American Farm Bureau Foundation for Agriculture was established in 1967 for the purposes of initiating and financing agricultural research and education. Funding for the foundation has been derived from three sources: individual donors, Farm Bureaus, and corporations and foundations.

The foundation operates on a two-year grant cycle. Research and education priorities are determined by the board of directors of the foundation. Upon determination of the priorities, requests for proposals are sent to land grant universities and other research institutions. The proposals are reviewed by scientists and specialists in the designated fields of study. Funding decisions are made by the board of directors based on the peer reviews.

Current research and education priorities of the foundation are:

(1) the changing structure of agricultural production and marketing and implications for farmers and ranchers, (2) development of an environmental index for watersheds located in agricultural areas, (3) development of a consumer education program on agricultural stewardship and agriculture's interaction with the environ-

ment, (4) the effects of multi-spectral satellite imagery on farms of the future, and (5) manure management—market development and utilization.

Ten projects are currently being funded, five of which are from the previous funding cycle:

(1) Economics and Environmental Impacts of Best Management Practices and Technology on Representative Corn/Soybean and Cotton Farms, The Ohio State Univ., (2) Economic and Environmental Impact of Grazing Systems on Lactating Dairy Cows, Univ. of FL, (3) Development and Demonstration of an Accurate Manure Spreading System to Protect Water Quality, Improve Waste Management and Farm Profitability, Univ. of WI, (4) Validating Alternative Manure Management Systems for Dairy and Beef Confined Feeding Operations, CO State Univ., (5) Evaluation of Dry Matter Basis Grain Marketing, Univ. of IL, (6) Developing New Remote Sensing Technology for More Economical Weed Control, Univ. Of ID, (7) Improving Nitrogen Management from Manure in a Corn-Soybean Rotation, Univ. Of MN-Waseca, (8) Development of an Index for the Assessment and Management of Agricultural Watersheds, Grand Valley State University, (9) Evaluation of Market Advisory Services for Agricultural Commodities, Univ. Of IL, and (10) Mobile Ag in the Classroom, Maryland Agricultural Education Foundation.

We appreciate this opportunity to comment on this important issue and look forward to working with you in promoting agricultural research.

Dr. Thayne R. Dutson
Dean and Director, Oregon State University
College of Agricultural Sciences

National Association of State Universities and Land-Grant Colleges

Subcommittee on Forestry, Resource Conservation, and Research,
of the Committee on Agriculture
U. S. House of Representatives
June 17, 1997

Mr. Chairman, members of the Committee, I would like to extend my appreciation for the opportunity to speak here today on the critical issues facing research, extension and education. I am here on behalf of the National Association of State Universities and Land-Grant Colleges (NASULGC), which has formed a coordinating committee to respond to Farm Bill Research, Education, and Extension reauthorization issues. This NASULGC committee includes representatives of the Vice Presidents and Deans of Colleges of Agriculture, State Agricultural Experiment Station Directors and 1890 Research Directors, State Extension Service Directors and 1890 Administrators, the Directors/Administrators of Academic Programs and International Programs, the Deans and Administrators of our colleges of human sciences, the colleges of natural resources and forestry, our colleges of veterinary medicine, and our national stakeholders' group – the Council for Agricultural Research, Extension, and Teaching (CARET). With your permission, I would like to summarize my remarks at this time and submit a more complete statement for the record.

The Land-Grant Universities

The founding legislation that established the land-grant institutions' agricultural research, education, and extension functions -- the State Experiment Stations and the Extension system -- created a new and unique mission: to apply science and technology to the problems of our communities and to convey that knowledge to the people through the classroom and through extension. This vision -- to integrate research, extension, and teaching to address "real-world" problems -- is what makes the land-grant institutions unique among other educational and research institutions. Today, seventy-five universities, working in close cooperation with the United States Department of Agriculture's (USDA) Cooperative State Research, Education, and Extension Service (CSREES), employ more that 24,000 professional staff. They reach out to 40 million Americans annually through the Cooperative Extension Service, educate more than 100,000 students in their colleges of agriculture and life sciences, and carry out thousands of research projects central to the nation's interests in food, agriculture, natural resources, and the environment. Our land-grant institutions are funded through a unique partnership among federal, state and county governments and the private sector. Federal investments in research and extension provide the federal government access to the research capacities of the states and an extension outreach system that reaches into every county in the nation. Every federal dollar invested leverages some $4 - $5 dollars in state and local funds. The land-grant universities' agricultural research, education, and extension functions work closely with their federal partner through CSREES, and we collaborate with the *Agricultural Research Service* (ARS). The land-grant institutions also work with most other federal agencies, as appropriate to the missions of those agencies. For the record, I have attached additional information that describes the history, mission, and activities of the land-grant universities.

Some Critical Issues

I would like to reserve the balance of my time to address several of the critical issues that will be considered by this committee: priorities, stakeholder input, accountability, and funding mechanisms.

Priorities

The Hatch Act of 1887 charges the land-grant institutions to address "...the problems of agriculture in its broadest aspects, and such investigations as have for their purpose the development and improvement of the rural home and rural life and the maximum contribution by agriculture to the welfare of the consumer, as may be deemed advisable, having due regard to the varying conditions and needs of the respective States." This charge is still applicable today. Some have suggested that federally-funded research, extension and education projects should be directed only to issues that are of economic importance to production agriculture. We disagree. Certainly production agriculture is critical to our country and the land-grant universities have a long tradition of working closely with agricultural producers. The land-grant universities' agricultural research, education, and extension functions are committed to continuing and enhancing this alliance in the future. However, there are many challenges facing agriculture, the food system, and communities that are outside the narrow definition of "production agriculture." In the future, the economic viability of agricultural production will depend heavily on post-harvest handling and shipping, value added processing, packaging, and marketing. Future trading and international competitiveness of agricultural products will depend on our ability to meet food safety standards; many trade debates will center on sanitary and phytosanitary standards. To remain competitive and viable, agricultural producers will need to understand international trade and international markets, as well as business and investment opportunities overseas. Agricultural producers will continue to face challenges to meet environmental regulations and standards; they will continue to need science-based tools to cost-effectively manage their resources. The U. S. public will continue to demand a food supply that is not only cheap and affordable, but also nutritious and safe.

Moreover, agricultural production occurs in communities, where there are economic and social challenges as well. Considering we are no longer an agrarian society with only two percent of our population directly involved in production agriculture, land-grant universities must be committed to ensuring a positive image of production agriculture in urban areas. We must continue to address natural resource issues, including forestry, grazing and wildlife issues of concern to the public. The land-grant community stands by its historic mission to bring the resources of science to address the full array of problems facing agriculture, youth (4-H), families, and our communities.

Stakeholder Input

The land-grant universities support stakeholder input in the priority-setting and program development process. Each university has an established process for soliciting stakeholder input. As an example, I would like to describe the system of stakeholder involvement in the land-grant programs in Oregon. Our goal is to have stakeholder involvement as close to the program delivery level as possible. As a result, we have Extension Advisory committees for each county Extension program, Experiment Station Advisory committees for each Branch Experiment Station and Advisory Committees for each Department on campus. This allows advisory input at the program delivery level to help us assure program relevance. In addition, we have a College Advisory Council that assists us in maintaining relevance of our overall programs and helps us assure program coordination among our research, extension and teaching programs in all program areas. In general, committee appointments include producers, processors, city and county officials, consumers, members of the environmental community, and members of the local business community.

As a system, the land-grant institutions have recently completed a national process for soliciting input from stakeholders. National and regional customer listening sessions involving more than 300 users of the products of land-grant universities provided a fresh new look at what is needed in agriculture and natural resources. Input from faculty and administrators across the country was solicited using the World Wide Web. The following principles were identified in this process.

- Land-grant institutions are responsible for helping their customers be more effective and competitive in the international marketplace. There is a need for research and education to more closely relate production and processing of food and fiber to consumer needs and preferences. Customers are asking land-grant universities to put their products together so that complex technology can be more readily used.

- The curricula and methods used in teaching must attract quality students and produce society-ready graduates. Land-grant universities and their graduates must serve an increasingly complex set of new interests that operate today in a multi-modal agricultural system.

- With the new Farm Bill, there is a growing need for knowledge, technology, and education to help producers of food and fiber be more competitive in the international marketplace and reduce and avoid risk. Customers ask that land-grant institutions' agricultural research, education, and extension functions use their knowledge to help develop policy options for decision-makers and to help interpret the impact of these decisions on farmers and ranchers.

- Environmental stewardship is recognized broadly by customers as being a key part of the new agenda for food and fiber production and processing. This includes development of better strategies for managing public and private forest lands and protecting biodiversity. Technology that combines economic and environmental payoff in socially acceptable ways should be high on the list of priorities.

- Land-grant institutions' agricultural research, education, and extension functions must develop knowledge and technology on new non-food uses for agricultural products and provide support for new non-traditional crops and recreational use of natural resources which have great economic impact as part of an expanding U. S. agriculture.

- Land-grant universities' agricultural research, education, and extension functions must make full use of new opportunities in science and technology to enhance the competitiveness of U. S. agriculture. The historical economic impact of research and education in agriculture and natural resources is projected to continue. Annual rates of return on investment of between 30% and 50% clearly establish the value of public funds in this area. While private sector investment contributes to research aimed at product development, it will clearly not serve as a substitute for public support of the broader agenda.

The full outcome and description of this stakeholder input process is described in a document entitled *From Issues to Action: A Plan for Action on Agriculture and Natural Resources for the Land Grant Universities*, which is submitted for the record.

In regard to stakeholder input at the national level, last year the Congress decided to redesign and streamline the processes for stakeholder input at USDA in the 1996 Farm Bill. This legislation created the National Agriculture Research, Extension, Education, and Economics Advisory Board (NAREEEAB). Some have suggested that a new array of panels and advisory groups should be created. We think this is premature. The new advisory board has had less than a year to get underway; its actions to date are promising. Moreover, it seems inappropriate to create a new raft of panels and committees immediately after the actions taken by the Congress to reduce bureaucracy. Some groups are concerned that there needs to be more private sector and industry representation on the NAREEEAB. We agree that this is appropriate. Perhaps the language creating the NAREEEAB could be strengthened by making it clear that NAREEEAB has authority and resources to create such panels and committees, with industry and private sector input as it deems necessary, to complete its advisory responsibilities.

Accountability

The land-grant universities' agricultural research, education, and extension functions support the development of an effective assessment of the impacts of research and extension programs. We suggest that any new requirements or direction be carefully integrated into the requirements of the Government Performance and Results Act of

1993, which has recently been developed and implemented by USDA. We support continued enhancement of the database that records federally-funded agricultural research, the Current Research Information System (CRIS) and the Food and Agricultural Education Information System (FAEIS)). We are working with USDA to implement the Research, Extension and Education Information System (REEIS) that was authorized in the 1998 Farm Bill, which encourages the development of "next generation" information management and communications technologies to facilitate impact assessment and reporting. The REEIS system is being developed so that it is consistent with GPRA requirements.

In order to monitor and measure accountability of our programs in Oregon, we have developed a database that allows us to measure program relevance as well as communicate how relevant our programs are to our stakeholders. We have called this database *Oregon Invests!* because it is designed to show the value to our stakeholders of the public dollars invested in our programs. Using *Oregon Invests!*, we have assessed the economic, environmental and social value of our programs. *Oregon Invests!* uses data generated at the individual program and project level and allows us to assess our value for counties, commodities, programs, departments, research stations and individual projects. I have attached several pages which demonstrate how *Oregon Invests!* is able to assist us in demonstrating our relevance and value.

Funding Mechanisms

The land-grant institutions' agricultural research, education, and extension functions strongly support the maintenance of a diversified portfolio of funding mechanisms for research, extension, and education. Each mechanism addresses a unique set of program needs. Various suggestions have been made regarding possible changes in the way that these funds are awarded and reviewed. I would like to respond to some of these suggestions.

Base Funds and Collaborative Projects

Some have recommended that 25% of research base funds should be expended on multi-state research that is multi-institutional, multi-agency and multi-disciplinary. We strongly support the concept of collaborating among states; indeed 25% of our base funds are already committed to multi-state projects. We support continuation of this multi-state requirement for research, but we are concerned that well-intentioned efforts could inadvertently create legislative language that is unnecessarily burdensome to implement. For example, there could be an outbreak of a disease that affected wheat in Oregon, Washington, Kansas and New York. An appropriate research project to address this outbreak could involve each state, but the most effective use of funds at this stage of the problem might be to invest all of the funds in plant pathology, which would not be multi-disciplinary. We support the requirement that 25% of the research base funds should be spent on multi-state projects, and that multi-institutional and multi disciplinary projects should be encouraged, but applying all requirements at the same time could be counter productive to solving real world problems. We do support peer-review and/or merit review for these projects.

It has also been suggested that 25% of extension base funds should be expended on projects that are multi-state, multi-institutional, multi-agency and multi-disciplinary. Again, we think that applying all three requirements simultaneously may be counter-productive. We would oppose any recommendations that would lead to an unnecessary layer of administration and program management. Moreover, extension and education projects currently are targeting specific locations where a site-specific presence makes sense. Where it is an efficient and productive use of resources, the land-grant universities' agricultural research, education, and extension functions utilize joint projects that cross state boundaries. In the case of extension and education programs, scientific peer-review has value, but is not the only appropriate mechanism. Merit review of these programs, in many instances, is a more practical, useful and effective approach.

Competitive Grants

We believe that all competitive research grants should be peer-reviewed. Some have suggested that the portfolio of competitively awarded grants should be reviewed by the NAREEEAB to ensure that there is adequate focus. We would not oppose this approach.

Special Grants

We support appropriate review of special grants. To the degree that it is appropriate for a specific project, special grants should foster partnerships between land-grant institutions' agricultural research, education, and extension functions, state governments, USDA and private industry. We agree that matching funds should be encouraged as appropriate for a specific project. We also recognize, however, that it is the Congress that funds and directs special grants and we will continue to respond to these directives as they are given.

Federal Challenge Grants

We support the Challenge Grants Program that enhances the educational experience of undergraduates in agriculture and natural resources curricula and provides the human capital so necessary to American agriculture.

Extension Funding

Some have proposed that any university should be able to compete for Extension Service funding. We agree that the 1890 and 1994 institutions, as land-grant institutions, should be allowed to apply for new competitively awarded funds. However, we do not agree that Extension Service funding should be made available to any and all universities. The Extension System is a nationwide educational network. This recommendation would essentially require other universities to duplicate this network, leading to redundancy, inefficiency and increased costs.

The Extension System is based on a unique partnership among the county, state and federal governments. Each of the partners is committed to contributing a share of resources to this network. Federal Extension Service funds are directed to the Extension Director/1890s Administrator in each State. Diverting funds to institutions that are outside of this financial partnership is tantamount to reducing the federal commitment to the Extension System. Given that the federal contribution is already substantially less than the amounts contributed by the states and county governments, we feel that this is an inappropriate action. Moreover, the Extension Directors/1890s Administrators have legal and fiscal management responsibility for federal extension funds and they are held accountable for how these funds are distributed within their state. Extension funding is appropriately targeted to linking the science-based resources of the land-grant universities' agricultural research, education, and extension functions to their local communities. This is not to say that other colleges and universities do not have valuable resources to extend to their communities, especially regarding issues outside the arena of agricultural production. Land-grant universities recognize this and are currently working in partnership with other colleges and universities to deliver quality outreach programs. These strategic alliances will continue to be expanded and enhanced in the future; however, no new or expanded authorization is necessary.

In Closing

Mr. Chairman, Members of the Committee, I would like to again express my appreciation for the opportunity to speak to these critical issues. I would be happy to answer any questions you may have at the appropriate time.

JUN 18 1997

National Association of Wheat Growers

415 Second Street, N.E., Suite 300, Washington, D.C. 20002 (202) 547-7800 ● Fax (202) 546-2638

June 13, 1997

The Honorable Larry Combest
Chairman, House Agriculture Subcommittee on Forestry,
Resource Conservation and Research
1301 Longworth House Office Building
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman

Enclosed is a brief summary of the research funding mechanisms utilized by U.S. wheat producers. Given the need to re-authorize the research title of the 1996 farm bill prior to September 30, 1997, and the desire of the committee to develop new legislation which enhances the opportunity to achieve long term economic benefits for producers, processors and consumers in general, we believe the committee should be aware of the substantial contribution which various industry sectors provide to the overall objective. On behalf of the National Association of Wheat Growers, I request that this information be included in the hearing record of the Subcommittee.

In addition, our organization would like to associate ourselves with the comments of Jimmy Sanford, who is representing the National Cotton Council before your subcommittee this week, concerning the value of the public/private partnership which exists relative to agriculture research. While there may be a lack of unanimity among all farm and commodity organizations relative to specific reauthorization goals, I believe that the agriculture community is fully united behind the broad objective of ensuring the maintenance of a viable and improved agriculture research system in the United States which recognizes and addresses both the strengths and needs of our diverse agriculture.

Please accept our appreciation for the difficult work in which you and the committee are engaged. Our organization stands ready to provide assistance in any way possible as the discussion over the research title moves forward.

Sincerely,

James W. Miller
Vice President - Government Affairs

National Association of Wheat Growers
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June 16, 1997

GENERAL SUMMARY OF U.S. WHEAT PRODUCER CONTRIBUTIONS TO AGRICULTURE RESEARCH

INTRODUCTION -

The U.S. wheat production industry is truly national in scope. On an annual basis, wheat growers produce a crop totaling between 2.1 and 2.5 billion bushels of wheat which has a farm-gate market value of approximately 8.0 to 10.0 billion dollars. Wheat is produced in commercial quantities in nearly every state in the Nation. The primary production regions are: the Northern and Southern Great Plains, the Pacific Northwest, Southeast, Upper Mid-west and the Southwest. In most instances, each region specializes in the production of one or two of the six classes of wheat grown in the United States. This regional specialization, due to environmental conditions in most instances, has created a need, and demonstrated the advisability of maintaining a geographically diverse research capability.

U.S. wheat producers have been actively engaged in their support of agriculture research in terms of each of the mission areas identified within the USDA Research, Education and Economics (REE) portfolio over a long period of time. Not only have wheat producers been interested in the more obvious and direct research endeavors of the Agriculture Research Service (ARS) and the Cooperative State Research, Education and Extension Service (CSREES); but also the efforts of the Economic Research Service (ERS) and the National Agriculture Statistic Service (NASS). This support has been manifested through a number of producer sponsored approaches including direct funding, partnering at both the federal and state levels and seeking public funding to initiate and maintain research continuity in a variety of areas. Beyond general support for agriculture research, wheat producers nationally have made major funding contributions individually, through producer associations and private, non-profit foundations to the accomplishment of basic and applied research goals. The programs funded by producers through state wheat commissions utilizing check-off returns have generated the most consistent and broad based source of producer sponsored research funding. It is those activities that will be the focus of the remainder of these comments.

STATE WHEAT COMMISSIONS -

Currently, 18 individual state wheat commissions exist within the United States and are operational in each of the wheat production regions heretofore identified with the exception of the upper mid-west. While each commission is organized under differing state laws, requirements and enabling legislation, generally they are limited in the utilization of the funds received through their check-off or assessment programs for research activities to benefit the wheat industry in the state, market development programs aimed at increasing wheat utilization and in support of producer and public education programs to enhance the economic well-being of the producer and industry as a whole. Management of commissions activities is usually directed an elected or appointed group of producers and in some cases, representatives of other sectors of the industry as well as designated state officials. The assessment rate is determined according to individual state laws which establish the check-off rate, either a fixed amount per bushel or a percentage of selling price, the method for collection and procedures for modifying the rates. Currently effective rates vary from about $0.01 per bushel to over $0.04 per bushel. Each state wheat commission establishes its budget on an annual basis determined in large part by the expected crop size, projected receipts and level of reserve funds. Funding for research varies from state-to-state based on available resources, competing needs for funding and research project opportunities. In general, state wheat commissions expend between one-third to one-half of their annual budgets on research activities primarily at state land grant universities or agriculture experiment stations. The eighteen state wheat commissions cumulatively provide several million dollars on an annual basis to further industry research objectives. Wheat commission expenditures on research are utilized to initiate specific projects as well as supplement or leverage other sources of funding including those from the federal or state government.

Statement of the USA Rice Federation
to the Subcommittee on Forestry, Resource Conservation, and Research
House Agriculture Committee
U.S. House of Representatives
Washington, D.C.
June 17, 1997

Mr. Chairman, I am pleased to provide the Subcommittee the following information on behalf of the USA Rice Federation for its hearing on Federal, state and private efforts in behalf of agricultural research. My name is John Denison. I am Vice Chairman of the USA Rice Federation and Chairman of one of its member organizations; namely, the U.S. Rice Producers' Group. The Federation represents the rice industry in the United States and consists of the U.S. Rice Producers' Group (a producers organization representing producers in the six principal rice producing states), the Rice Millers' Association (an organization representing rice milling organizations and allied industries in the United States), and the USA Rice Council (the rice industry market promotion organization).

I would like to describe for the Subcommittee recent efforts undertaken by the rice industry in the area of rice research. To begin with, we believe that the research and extension program of the Department of Agriculture has proven beneficial to the rice industry and agriculture as a whole, that it has been responsible in large part for the success of agriculture in the United States and in placing this country at the forefront of agriculture developments in the world. However, we believe that however good it has been, it can always be improved and the rice industry has undertaken efforts to that end.

Funds for rice research are derived from several sources. In addition to funds derived from federal sources, it has received funds generated by producer assessments under state research and promotion legislation (familiarly called check-off programs) and to a lesser extent with funds derived from private sources through an affiliated organization called the Rice Foundation. The state rice check-off programs are administered by state research boards consisting of producers appointed under state legislation that typically provide the funds they receive to the state land grant universities and interact with them as to the needs and priorities that the boards believe should be addressed. In addition, they provide oversight regarding ongoing rice research projects to assure that the funds are being spent appropriately. In the past, the Rice Foundation has worked with private industry to obtain supplemental funds for conducting applied research on important projects.

Recently, the USA Rice Federation embarked on an effort to streamline rice industry coordination and communication in determining rice research needs and priorities regarding research projects funded with federal, state and private funds. It established a special committee called the Research and Development Committee with the function of administering the research programs of the Rice Foundation and providing rice industry participation in other research efforts affecting the rice industry. In order to assure that there is full participation of all industry stake holders, its members consist equally of representatives of producers, millers, suppliers to the rice industry, and users of rice and rice products.

A subcommittee consisting of producer representatives from each of the six principal rice producing states, was also appointed to undertake efforts to achieve a more uniform method for evaluating research proposals that are received for potential funding by the state research boards and identify better ways to spend producers' money on rice research and education. The project was facilitated by a management consulting firm that specializes in providing management counseling to food and agribusiness companies and the organizations that serve them.

The facilitator has just issued his report. The facilitator recommended that state research boards should evaluate production research and producer education projects based on the economic benefits to the producer as well as taking account of market place needs. He stated that each state should have a clear understanding of its long-term objectives for research, as well as a reasonable strategy for accomplishing these objectives. He recommended that each state should fund research jointly where appropriate and proposed a common evaluation process across all states on proposed research projects. In order to assist in accomplishing these objectives, the facilitator stated that there needs to be identified common areas of interest across state lines, activities that realistically could be funded jointly, and a mechanism for pooling money together for common interest projects. Finally, he recommended that a full-time technical coordinator should be employed to assist states in R & D by providing scientific and technical expertise independent of the state university system.

The report is being considered by the Research and Development Committee for further action. Mr. Chairman, please let me know if we can provide further information regarding rice research to the Subcommittee.

AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION PROGRAMS

WEDNESDAY, JUNE 18, 1997

House of Representatives,
Subcommittee on Forestry, Resource
Conservation, and Research,
Committee on Agriculture,
Washington, DC.

The subcommittee met, pursuant to call, at 10:00 a.m., in room 1300, Longworth House Office Building, Hon. Larry Combest (chairman of the subcommittee) presiding.

Present: Representatives Smith, Lewis, Chambliss, LaHood, Moran, Dooley, Brown, Farr, Stabenow, Pomeroy, Baldacci, Berry, and Stenholm [ex officio].

Also present: Representative Crapo.

Staff present: John E. Hogan, chief counsel; Russell Laird, John Goldberg, Callista Bisek, Anne Simmons, and Wanda Worsham, clerk.

OPENING STATEMENT OF HON. LARRY COMBEST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Combest. Good morning, and I want to thank everyone for being here. The committee will come to order.

Today is the second in our series of hearings to review agricultural research, education, and extension programs. Yesterday we explored many issues, including the question: why is it so difficult to maintain adequate funding for agricultural research?

In questioning by Representative Brown, it was revealed that part of the problem is the inability of scientists to adequately relate to the American public the benefits that are derived from agricultural research programs.

For instance, in today's testimony, we will hear about how agricultural research has led to the development of a drug that we consider very basic today, penicillin, and today's leading treatments for AIDS/HIV.

Why is the fact that agricultural research is making significant contributions to the treatment of HIV is confined to this room and not the national news?

We also had an extensive discussion with three major elements of the agricultural research system, Agricultural Research Service, state universities, and the private sector. During this discussion, we focused on the current and future roles each of the entities will play.

In doing so, we asked our witnesses to take a giant step back and tell us if the current system were to be rebuilt would it come out the same way.

Having differentiated the roles of the three major entities, our agenda today is to review several examples of how the entities coordinate their activities. Specifically, we would like to evaluate ongoing partnerships between the public and the private sectors in which minimal resources are leveraged to maximize results.

We will continue with our theme of improving the efficiency of our research and reducing or eliminating any duplication of research efforts in light of the tight budget situation. While the examples we will discuss today are ongoing partnership projects, I would like to explore any possibilities for encouraging the formation of these partnerships whenever possible in all of our research, education, and extension activities.

Again, I would say that I appreciate the efforts of all of you who have come today, and I look forward to hearing those discussions, and would recognize any other members for opening comments they might make.

Mr. Lewis.

OPENING STATEMENT OF HON. RON LEWIS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF KENTUCKY

Mr. LEWIS. Thank you, Mr. Chairman.

I do appreciate you holding these hearings. As you know, I am a strong supporter of research and extension programs. I believe they must remain an important source of information for our farmers and ranchers.

I believe that agricultural research holds the key to unlocking the door to long-term farm production, efficiency, productivity, and profitability, while at the same time minimizing the unintended impact on the environment.

We, as members of the Agriculture Committee, have a very important question considering this reauthorization of the research title. Is our country's traditional agricultural research system prepared for the challenges the next century will bring? And if not, what reforms or changes should be made in the law to prepare the research system for the 21st century?

Today is an exciting time, of course, for agriculture production. The research reauthorization must complement the new farm bill and direction of our Nation's agriculture policy. It is vital that we help provide for research so that our farmers and ranchers will continue to be the world's most efficient producers of food and fiber.

Mr. Chairman, I look forward to working with you and our colleagues to prepare agriculture for the challenges that will face them in the future.

Thank you.

Mr. COMBEST. Thank you, Mr. Lewis.

Mr. LaHood.

OPENING STATEMENT OF HON. RAY LAHOOD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. LAHOOD. Mr. Chairman, thank you for holding this series of hearings on the future of agricultural research. As the Federal

Government encourages farmers and ranchers to get more of its income from the marketplace, Federal agricultural research becomes a critical catalyst.

We must maintain a strong public and private effort in order for American agriculture to continue to be profitable and competitive in the global economy. The challenges involved with balancing the Federal budget will continue to force Congress to make difficult spending choices in high priority programs, such as research.

In this country, the partnership between producers and researchers supported by Federal and State money has created an unprecedented level of productivity at which 3 percent of the population feeds the other 97 percent and generates billions in export opportunities for America.

The United States provides the world not only with food, but with the technical skill to produce it better. The need for more of both can easily be read in those population figures.

Before I go further, Mr. Chairman, I would like to acknowledge two gentlemen from my district and from my home town of Peoria. It is a pleasure to have both of them here. They distinguish themselves in their professional careers.

Dr. Peter Johnsen is currently the director of the National Center for Agricultural Utilization Research and the Agriculture Research Center facility in Peoria, and the center is a major research facility of the USDA Agricultural Research Service. Work at the center focuses on the innovation and invention of products and uses of agricultural commodities encompassing three areas: finding new market opportunities for commodities, securing environmental quality and compatibility, and insuring food safety.

As the designated lead USDA technology transfer facility, the lab accelerates commercialization of promising products and technology from the lab to the marketplace through innovative partnership with the private sector, and Dr. Johnsen's leadership has been noted time and time again.

Also with us today is Dr. Grant Brewen, who is a research scientist and has distinguished himself in a number of areas, and both Dr. Johnsen and Dr. Brewen are distinguished members of our community and have contributed so much to the BRDC Program around the country in their innovation and their vision for the future.

Mr. Chairman, I ask unanimous consent that the remainder of my remarks be placed in the record.

Mr. COMBEST. Without objection. Thank you, Mr. LaHood.

The Chair will recognize a guest member, a former member of this committee, and a very significant member in the area of agriculture, Mr. Crapo.

OPENING STATEMENT OF HON. MICHAEL D. CRAPO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

Mr. CRAPO. Thank you, Mr. Chairman. I appreciate your allowing me to sit with the committee again and participate in this hearing to discuss the important issues relating to the future direction of agricultural research.

Research extension and education programs have played a critical role in achieving the current productivity and competitiveness of U.S. agriculture, while providing taxpayers a rate of return of 30 to 50 percent per year, and I would first like to welcome Mr. John Martinell, a constituent of mine who will be testifying today.

Agriculture currently faces many challenges and opportunities that extend well beyond the farm gate, and in order to address these multiple and complex needs, we must reinvest in agricultural research, extension, and education, which has in large part been responsible for the current achievements in productivity and competitiveness of U.S. agriculture.

There is a growing need for infusion of resources that will provide problem and opportunity oriented research to meet the needs of the entire agricultural system, and this call for a strong reinvestment in agricultural research, extension, and education has been a resounding theme at every agricultural meeting and forum, hearing or workshop that I have attended over the past 2 years.

The rationale for this new agricultural research initiative is related to the importance of sustaining and even increasing the knowledge and technological base for U.S. agriculture to meet the demands of a global free market.

Research extension and higher education should focus on both long and short-term issues affecting agriculture. New agricultural research initiatives should be designed as an aggressive, coordinated research and education program between the USDA, universities, national labs, and industry, with agricultural industries playing a pivotal role in setting the priorities.

And I feel strongly about this new research initiative because I, along with many of my colleagues, have devoted significant effort to coordinating and developing legislation for the advancement of what has become know as precision agriculture.

Virtually no aspect of agriculture remains unaffected by recent advancements in precision agricultural technologies. The positive impact precision agriculture promises to have on this Nation's agriculture could well exceed the cumulative gains since the introduction of machines and chemicals to agricultural systems.

I expect that as agriculture stands on the brink of the Information Age, the emergence of precision agricultural technologies and tools, coupled with a strong and appropriate Federal research and education role, can accomplish many of the challenges we face.

And, Mr. Chairman, I would submit the remainder of my remarks for the record, but, again, thank you very much for the opportunity to be with you briefly today, and I encourage your strong consideration of precision agricultural initiatives.

Mr. COMBEST. Thank you, Mr. Crapo.

Without objection, all members' statements will be made a part of the record.

[The prepared statements of Mr. Smith, Mrs. Chenoweth, and Messrs. LaHood and Crapo follow:]

NICK SMITH OPEN STATEMENT

At least some of our agricultural research goals should be to help US farmers and ranchers.

One of the ways production agriculture can benefit is to have better and more timely supply and demand information.

Research is needed to improve the efficiency and ability to predict and disseminate yields of crops grown in this and other countries that would be helpful to our growers as they make these planting decisions.

A case in point is better use of information that can be gained from our satellite and space flight radar and multi spectrum colour data to predict crop and yield supplies.

I understand it is now possible to predict crop acres and crop yield within a plus or minus 10% deviation up to 60 days before harvest.

Tremendous help to our farmers Mr. Chairman and I hope we vigorously pursue it.

Statement of Representative Helen Chenoweth
Committee on Agriculture

Subcommittee on Forestry, Resource Conservation and Research
1300 Longworth House Office Building
June 18, 1997

Thank you Mr. Chairman. I would like to commend this committee for holding this hearing on agricultural research.

I would like to welcome Mr. John Martinell, Program Manager for Agricultural Programs at the Lockheed Martin Idaho Technologies Company. Mr. Martinell, I am happy to have you here with us today, and I look forward to hearing from you.

Agriculture is a **growth industry** in this nation, while so many traditional industries are failing. United States agricultural output has doubled since 1950 and it remains our nation's number one industry.

Mr. Chairman, people, as citizens and consumers, are the winners when our agricultural system meets society's needs for safe, wholesome, and affordable food, fiber, and other renewable resources Surely a healthy food production system, environment, and economy are critical for a strong American family structure.

Mr. Chairman, it is science and engineering research -- like the work done at the **University of Idaho** -- that reach out to millions of Americans annually, and is credited with developing and disseminating the technologies that have helped to make U.S. agriculture the most productive in the world.

We must continue to promote agricultural research cooperation at all levels -- federal, state, and county. An effective research system can be achieved by a partnership between the federal government, through the United States Department of Agriculture research and education programs, and the land grant university system, supported by federal, state and local governments.

A joint agricultural research partnership at all levels will result in a safe, abundant, and affordable food and fiber supply.

Mr. Chairman, however, the system is currently facing serious challenges from budget constraints at both the federal and state level, from scientific advances that have new implications for the research and extension system as well as for the United States food and fiber system as a whole.

In order to meet the public demands for progress in such areas as natural resource conservation, environmental protection, food safety, farm worker safety, and rural development the role of the federal government is to support basic and applied research on issues of national and regional importance.

The federal government should provide leadership in coordinating with state and private industry partners to set goals and to keep the research vision forward-looking and focused on areas with high social payoff.

Thank you Mr. Chairman.

Statement of the Honorable Ray LaHood

Committee on Agriculture
Subcommittee on Forestry, Resource Conservation, and Research
United States House of Representatives
Wednesday June 17, 1997

Mr. Chairman, thank you for holding this series of hearings on the future of agriculture research. As the federal government encourages farmers and ranchers to get more of its income from the marketplace, federal agriculture research becomes a critical catalyst. We must maintain a strong public and private effort in order for American agriculture to continue to be profitable and competitive in the global economy. The challenges involved with balancing the federal budget will continue to force congress to make difficult spending choices in high priority programs, such as research. In this country, the partnership between producers and researchers supported by federal and state money has created an unprecedented level of productivity at which three percent of the population feeds the other ninety-seven percent and generates billions in export opportunities for America. The United States provides the world not only with food but with the technical skill to produce it better. The need for more of both can easily be read in those population figures.

However, before we go any further, I want to introduce Dr(s). Peter Johnsen and J. Grant Brewen. Both of these gentlemen are from my home town of Peoria, Illinois. It is indeed a pleasure and a honor to have them testify here today. They have distinguished themselves in their professional careers. Dr. Johnsen is currently the Director of the National Center for Agricultural Utilization Research (NCAUR), an Agricultural Research Service (ARS) facility in Peoria, Illinois. The center is a major research facility of the United States Department of Agricultures' Agricultural

Research Service. Work at the center focuses on the invention of products and uses for agricultural commodities encompassing three areas: finding new market opportunities for commodities, securing environmental quality and compatibility, and ensuring food safety. As the designated lead USDA Technology Transfer Facility, the lab accelerates commercialization of promising products and technology from the lab to the marketplace through innovative partnerships with the private sector. Due to Dr. Johnsen's leadership, Mr. Chairman, the Peoria lab has distinguished itself as the preeminent research facility for corn and soybeans in the world. Its research conclusions are used by thousands of American households.

Dr. Brewen has been a research scientist all of his professional life. He distinguished himself while a student at Johns Hopkins University and later at the Oak Ridge National Laboratory in Oak

Ridge, Tennessee. Dr. Johnsen has been President and Chief Executive Officer (CEO) of the Biotechnology Research and Development Corporation (BRDC) of Peoria, Illinois. BRDC was formed over twelve years ago to develop a unique concept of a research and development consortium to facilitate a working relationship between private, federal, and state entities in order to transfer technology more efficiently from the public to the private sector, where it can be successfully commercialized. The vision of these individuals could not have been more on target. Today, every federal research organization is actively engaged in Cooperative Research and Development Agreements (CRADAs), patterned after the pioneering efforts of the BRDC.

A dozen years later, BRDC and ARS have forged a partnership that is viewed as perhaps the most successful example of technology transfer in the nation. This partnership in research and commercial development will only become stronger with the support of this Committee and Congress. Government/private sector partnerships benefit everyone, particularly the consumer and wage earner. BRDC and ARS have demonstrated that this unique partnership can produce results that benefit every segment of our society.

Once again, Mr. Chairman, I want to thank you for holding the hearing and for the privilege of allowing Drs. Johnsen and Brewen the opportunity to tell their story. I hope that everyone will take the time to review their testimony, because the future of agriculture rests on the kinds of research agreements and conclusions these gentlemen have involved themselves. They are truly pioneers in their field. I thank them and agriculture thanks them for dedicating their professional careers to this endeavor.

Mr. Chairman, I again want to thank you and your staff for the opportunity to tell the success story of agricultural research. You have distinguished yourself as a true leader as our Subcommittee Chairman. Also, your staff has been most cooperative in attempting to accommodate our every need.

MICHAEL D. CRAPO

HOUSE MAJORITY LEADERSHIP

DEPUTY WHIP

HOUSE CAUCUS MEMBERSHIPS

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Congreſs of the United States
House of Representatives
Washington, DC 20515-1202

COMMERCE COMMITTEE

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RESOURCES COMMITTEE

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REPUBLICAN POLICY COMMITTEE

WEB PAGE

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STATEMENT OF REPRESENTATIVE MIKE CRAPO
RESOURCE CONSERVATION, RESEARCH AND FORESTRY SUBCOMMITTEE

June 18, 1996

GOOD MORNING AND THANK YOU FOR ALLOWING ME THE OPPORTUNITY TO PARTICIPATE IN THIS HEARING TO DISCUSS THE FUTURE DIRECTION OF AGRICULTURE RESEARCH. RESEARCH, EXTENSION, AND EDUCATION PROGRAMS HAVE PLAYED A CRITICAL ROLE IN ACHIEVING THE CURRENT PRODUCTIVITY AND COMPETITIVENESS OF U.S. AGRICULTURE WHILE PROVIDING TAXPAYERS A RATE OF RETURN OF 30-50% PER YEAR. I WOULD FIRST LIKE TO WELCOME MR. JOHN MARTINELL, A CONSTITUENT OF MINE WHO WILL BE TESTIFYING TODAY.

AGRICULTURE CURRENTLY FACES MANY CHALLENGES AND OPPORTUNITIES THAT EXTEND WELL BEYOND THE FARM GATE. IN ORDER TO ADDRESS THESE MULTIPLE AND COMPLEX NEEDS, WE MUST REINVEST IN AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION WHICH HAS, IN LARGE PART, BEEN RESPONSIBLE FOR CURRENT ACHIEVEMENTS IN THE PRODUCTIVITY AND COMPETITIVENESS OF U.S. AGRICULTURE. THERE IS A GROWING NEED FOR AN INFUSION OF RESOURCES THAT WILL PROVIDE PROBLEM- AND OPPORTUNITY-ORIENTED RESEARCH TO MEET THE NEEDS OF THE ENTIRE AGRICULTURAL SYSTEM.

THIS CALL FOR A STRONG REINVESTMENT IN AGRICULTURAL RESEARCH, EXTENSION, AND EDUCATION HAS BEEN A RESOUNDING THEME AT EVERY AGRICULTURAL MEETING, FORUM, HEARING, OR WORKSHOP I HAVE ATTENDED OVER THE PAST TWO YEARS.

THE RATIONALE FOR THIS NEW AGRICULTURE RESEARCH INITIATIVE IS RELATED TO THE IMPORTANCE OF SUSTAINING, AND EVEN INCREASING, THE KNOWLEDGE AND TECHNOLOGICAL BASE FOR U.S. AGRICULTURE TO MEET THE DEMANDS OF A GLOBAL FREE MARKET. RESEARCH, EXTENSION, AND HIGHER SHOULD FOCUS ON BOTH LONG AND SHORT TERM ISSUES AFFECTING AGRICULTURE. NEW AGRICULTURE RESEARCH INITIATIVES SHOULD BE DESIGNED AS AN AGGRESSIVE, COORDINATED RESEARCH AND EDUCATION PROGRAM BETWEEN USDA, UNIVERSITIES, NATIONAL LABORATORIES, AND INDUSTRY, WITH AGRICULTURAL INDUSTRIES PLAYING A PIVOTAL ROLE IN SETTING THE PRIORITIES.

I FEEL VERY STRONGLY ABOUT THIS NEW RESEARCH INITIATIVE BECAUSE I, ALONG WITH MANY OF MY COLLEAGUES HAVE DEVOTED SIGNIFICANT EFFORT TO COORDINATING AND DEVELOPING LEGISLATION FOR THE ADVANCEMENT OF WHAT HAS BECOME KNOWN AS "PRECISION AGRICULTURE." VIRTUALLY NO ASPECT OF AGRICULTURE REMAINS UNAFFECTED BY RECENT ADVANCEMENTS IN PRECISION AGRICULTURE TECHNOLOGIES. THE POSITIVE IMPACT PRECISION AGRICULTURE PROMISES TO HAVE ON THIS NATION'S AGRICULTURE COULD VERY WELL EXCEED THE CUMULATIVE GAINS SINCE THE INTRODUCTION OF MACHINES AND CHEMICALS TO AGRICULTURE SYSTEMS. I EXPECT THAT AS AGRICULTURE STANDS ON THE BRINK OF THE INFORMATION AGE, THE EMERGENCE OF PRECISION AGRICULTURE TECHNOLOGIES AND TOOLS, COUPLED WITH A STRONG AND APPROPRIATE FEDERAL RESEARCH AND EDUCATION ROLE, CAN ACCOMPLISH MANY OF THE CHALLENGES AGRICULTURE FACES TODAY.

INCREASED DEMANDS ON THE U.S. AGRICULTURE SYSTEM WILL DRAMATICALLY INTENSIFY THE NEED FOR NEW KNOWLEDGE AND TECHNOLOGY TO ALLOW THE U.S TO SHARPEN ITS COMPETITIVE EDGE IN THE WORLD MARKET AND CONTINUE TO PRODUCE AND PROCESS NUTRITIOUS, ACCEPTABLE, AND SAFE PRODUCTS THAT MEET ENVIRONMENTAL AND CONSUMER STANDARDS.

TO ADDRESS THESE CHALLENGES, THERE IS A GROWING NEED FOR AN INFUSION OF RESOURCES THAT WILL PROVIDE PROBLEM- AND OPPORTUNITY-ORIENTED RESEARCH, EXTENSION, AND EDUCATION TO ASSIST THE ENTIRE AGRICULTURE SYSTEM, INCLUDING PLANT AND ANIMAL SCIENCES, PROCESS AND RELATED MARKETING, AND NATURAL RESOURCES, IN THE TRANSITION INTO THE MORE COMPETITIVE ENVIRONMENT THAT IS UNFOLDING, WHILE ALSO DEVELOPING THE NEXT GENERATION OF KNOWLEDGE AND TECHNOLOGY NEEDED TO MAINTAIN INTERNATIONAL COMPETITIVENESS OVER THE LONG HAUL.

AS GOVERNMENT AGRICULTURE PAYMENTS ARE REDUCED, IT WILL BE NECESSARY TO ASSIST THE UNITED STATES AGRICULTURE AND FOOD SYSTEM IN TRANSITION TO A MORE DEMANDING AND COMPETITIVE ENVIRONMENT.

I LOOK FORWARD TO WORKING WITH THE DEPARTMENT OF AGRICULTURE AND THE REST OF THE AGRICULTURE COMMITTEE TO PROMOTE A RESEARCH PROGRAM THAT WILL BRING BETTER BALANCE TO THE TOTAL RESEARCH AND EXTENSION PORTFOLIO, WHILE ADDRESSING THOSE AREAS IN WHICH CURRENT FUNDING RELATIVE TO NATIONAL AGRICULTURAL RESEARCH PRIORITIES IS INADEQUATE.

Mr. COMBEST. Mr. Baldacci, do you have any opening remarks?

Mr. BALDACCI. No, sir. Will we have an opportunity if we do have any more formal remarks to have them entered into the record?

Mr. COMBEST. Absolutely.

Mr. BALDACCI. Thank you.

Mr. COMBEST. Mr. Brown?

Mr. BROWN. No.

Mr. COMBEST. Mr. Berry?

Mr. BERRY. No. Thank you, Mr. Chairman.

Mr. COMBEST. The record will remain open for 10 days and Members are welcome to submit statements until then.

I, again, thank our witnesses who are at the table. Let me give a short introduction in addition to the very eloquent introduction Mr. Crapo and Mr. LaHood gave.

Dr. Robert Armstrong is Acting Executive Director for the Alternative Agricultural Research and Commercialization Corporation of USDA.

Dr. Bob Robinson is the Administrator for the Cooperative State Research, Education and Extension Service. Dr. Robinson is representing the Agricultural Research and Development Center.

Dr. Peter Johnsen is Director of the National Center for Agricultural Utilization Research of USDA from Peoria, Illinois.

Dr. Grant Brewen is the president and CEO for the Biotechnology Research Development Corporation in Peoria, IL.

Mr. Nyle Wollenhaupt is staff soil scientist and agronomist for the Ag-Chem Equipment Company, Inc.

Mr. John Martinell is the program manager for agricultural programs at Lockheed Martin Idaho Technologies Company.

Mr. Kent Nix is a steering committee member of the Agricultural Complex for Advanced Research and Extension System.

We will enter all of your complete statements and any other documentation that you would wish for this hearing in the record, would recognize you if it is agreeable in the order that you were announced for any opening comments that you might make, and again, thank you for coming.

Dr. Armstrong.

STATEMENT OF ROBERT E. ARMSTRONG, ACTING EXECUTIVE DIRECTOR, ALTERNATIVE AGRICULTURAL RESEARCH AND COMMERCIALIZATION CORPORATION

Mr. ARMSTRONG. Thank you, Mr. Chairman, and other members of the subcommittee for the opportunity.

What I want to do is just briefly summarize my full remarks, explain who we are at the AARC Corporation, how we interact with the other organizations within USDA, that is, the public-public interaction, and then how we interact with the private sector, especially the capital markets, and then conclude with identifying some unmet research needs that we at AARC see.

AARC is a wholly-owned corporation of the U.S. Department of Agriculture, and we function as a venture capital firm and invest in companies that are commercializing products made from agricultural materials, animal byproducts, and forestry materials that they are bringing into the marketplace.

We grew out of a 1987 task force established by the then Secretary of Agriculture, the Farm and Forest Product Task Force, that identified new crops and new uses for old crops as a goal for revitalizing American agriculture.

Commercialization, as I indicated, is our work at the AARC Corporation, investing in these companies, but research is our life blood, and I will draw on a couple of examples later in my testimony where two of our companies; in particular, have grown out of the USDA research effort.

On the public-private side, I want to indicate our relationship with private money that comes to these companies. For every $1 that AARC invests in a company, they bring between $3½ to $4 of private sector money to the table. In 5 of our companies, and we now have approximately 60 to 65 investments, 5 of our largest performing companies, which constitutes a total of about a $3.75 million investment on the part of ARC, those companies have been able to raise over $52 million in the private capital markets, just showing the strength of this public-private partnership.

Now I want to talk a bit about the public-public partnership, and that is our interaction with sister organizations within USDA. We rely heavily on ARS when we get a proposal, to advise us on some of the technical aspects of a proposal. Many of their scientists are in our database for technical reviewers, and they share information with us about new technologies with commercial potential. We have a very good working relationship with their technology development group.

Cooperative Research, Education and Extension Service, we rely upon those folks, as well, in our due diligence, again, to do technical reviews of projects that are sent to us.

Forest Products Research Laboratory, and this is really one of my favorite stories of ARC. The Gridcore Corporation, Gridcore Systems International in California, is a company that we have about $2.5 million in. It altogether is capitalized to around the 20-some million dollar level. The product that they make is a strong, light weight building material used for interior panels, construction of display sets for trade shows, that sort of thing.

That is a product that was developed and sitting on the shelf at the Forest Products Research Lab. They licensed the technology. We, with our initial investment, helped get the company going. So there is a very good illustration of the public-public interaction and partnership between us and Forest Products and in the public-private.

The Small Business Innovative Research Program is another good illustration of both that public-public and public-private. Our second largest investment is in a company called Natural Fibers. They are growing a crop, milkweed actually, syriaca, and they take that and blend it with goose down and make comforters and pillows, and the advantage is that they are hypoallergenic.

Well, they got their start from an SBIR grant, and then we came along as they progressed and have invested money in them, and they have now got sales of in the $2 to $3 million range.

Last year, Secretary Glickman established an Interagency Council to coordinate research, development, and commercialization of products from agricultural materials. This Bio-based Products Coordinating Committee focuses on the functional integration within USDA on all of these issues and policies pertaining to the bio-based value added products.

Members include ARC, SBIR, ARS, Economic Research, Forest Service, Rural Business and Cooperative Development, Agricultural Marketing Service, Foreign Agricultural Service, and Natural Resource and Conservation Service.

So within the Department, there is very much an integrated public-public relationship and interaction to move us towards this bio-based economy that is our vision.

And finally, on the ARC's board of directors, as you know, we have an 11-person board of directors, 8 of whom are from the private sector, but by legislation the incumbent as the Under Secretary for Research, Education, and Economics sits on our board. So that is another tie that we have to the research community and making sure that we continue that public-public partnership.

I want to conclude by just commenting on a few unmet research needs that we at AARC see. Since we are at the end of the pipeline, the commercialization stage, and looking back, what do we need to be working on now so that we have got products to come into the marketplace?

Foremost among them as we see is the development of new fiber crops. We have investments in some of these crops at the moment, as I mentioned, syriaca or milkweed. Kenaf is another fibrous crop with a tremendous potential. At the moment, German car companies are looking at making the door panels out of kenaf. All told, we grow about 2,000 acres of kenaf in this country. There is huge potential for increased kenaf production.

Purdue University has a new crop center, which we work fairly close with, and identifying down the road what other aspects of new crops we need to be looking at. Fiber crops, as I mentioned, is one, but the next big one, in particular, that Purdue has identified as well is in the oilseeds area.

The oilseeds are bio friendly. They have in many cases superior performance as opposed to petroleum replacements. We have a considerable amount of money in oilseed investment. One, in the State of Oregon, meadowfoam, we have just earmarked a $1 million investment for the development of meadowfoam.

Castor is another example. Castor was grown in the United States until after World War II. Now all of our castor oil is imported. Tung oil, which comes from the nut from the tung tree, exactly the same story. The tung industry was destroyed several years ago by a hurricane, and now whatever tung oil we use we import.

So in closing, I just want to reiterate, as I do in the written testimony, that perhaps it is time to reestablish the New Farm and Products Task Force to look at the integration of these things, where we are in commercialization, where we are in our unmet research needs, the public-public partnerships, for example, those that AARC has with other USDA agencies, and the public-private partnerships, again, as an example, the relationship that we have with private capital markets to get many of these deals done and capitalized and into the marketplace.

And thank you, Mr. Chairman, and I would be happy to answer any questions later.

[The prepared statement of Mr. Armstrong appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Armstrong.

Dr. Robinson, welcome.

STATEMENT OF BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. ROBINSON. Thank you, Mr. Chairman.

I am delighted to be with you again today as you continue the discussions and deal with the very important issues surrounding the reauthorization of the Research, Education and Extension Title to the farm bill.

I am here today to represent the Department of Agriculture and, at your request, to talk about the Binational Agricultural Research and Development Program. BARD is the result of a 1977 binational agreement between the United States and Israel. Under the belief that greater cooperation between the two countries' scientific communities would synergistically stimulate advances in science and in agriculture, BARD is guided by a board of directors with membership from both countries.

Within the mission of the Cooperative State Research, Education and Extension Service of USDA, BARD is a special research grants program that competitively supports fundamental research in the areas of animal and plant sciences, economics, and engineering that are important to agriculture in both the United States and Israel.

Funds in support of the BARD Program are from two sources. Beginning in 1977, as I mentioned, when the program began, interest paid on an endowment fund jointly established by the United States and Israel has supported the program. Both Israel and the United States have contributed equal amounts on two occasions to create a total endowment fund now of $110 million.

But starting in fiscal 1994, additional funds provided directly by the United States and Israel have significantly increased funding for BARD grants. An additional $2.5 million was provided by the United States in both fiscal years 1995 and 1996, and $2 million was authorized and is provided in fiscal year 1997.

The total amount available to the BARD Program, including the interest earned on the endowment and funds provided by both Governments, is currently over $12 million annually. Prior to the drop in interest rates in 1993, the greatest level of program funds available for BARD was in 1991 with a total of $9.4 million.

Each grant application to the BARD Program must be a joint effort by a team of U.S. and Israeli scientists. Each proposal submitted to BARD receives a peer evaluation. Only those proposals which are reviewed and considered meritorious are funded, and all proposals awarded by the BARD Program must have significance both to the U.S. and to Israeli agriculture.

While many U.S. institutions receive funding through BARD, the majority of the funding goes to the land grant universities and to the Agricultural Research Service. The Cooperative State Research, Education and Extension Service, direct appropriation used in BARD, is used to fund land grant university grants.

Much of the research supported by the BARD Program concentrates on issues of animal and plant health, including studies of the pests and pathogens of both plants and animals and responses of plants to environmental conditions, particularly crops grown on warm, dry climates.

Many accomplishments in fundamental sciences have been made in these areas that will lead to the development of plants resistant to disease, pests, and hard and harsh environmental conditions, reduction in livestock diseases; and increased livestock production.

BARD research grants have led to the discovery of a powerful antiviral substance in tobacco plants that can be used to protect tomato plants. Also, an accomplishment is the development of a vaccine in Rift Valley Fever, a debilitating disease of cattle and sheep and even humans.

Another accomplishment is the development of a method to help pecan growers in the American Southwest deal with the damaging effects of soil salinity, which has caused premature death and stunted growth of pecan trees, as well as low yields. The new methods save trees and return them to full production.

Of the awards, for your information, for the last few years, 36 awards came to the United States, 30 of these to universities generally, most of which were land grants, and 6 to ARS.

In 1996, 35 of the awards came to the U.S., 33 going to universities and 2 to ARS.

And in 1995, 34 awards came to the U.S., 28 to universities and 6 to ARS, and I point out all of these projects must have cooperating scientists from both countries.

Mr. Chairman, at this time I would like to conclude the summary of my remarks and would be happy to answer questions at the appropriate time.

[The prepared statement of Mr. Robinson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Dr. Robinson.

Dr. Johnsen.

STATEMENT OF PETER JOHNSEN, DIRECTOR, NATIONAL CENTER FOR AGRICULTURAL UTILIZATION RESEARCH, U.S. DEPARTMENT OF AGRICULTURE

Mr. JOHNSEN. Thank you, Mr. Chairman, for inviting me, and thank you, Mr. LaHood, for those kind comments.

Today I would like to describe the importance of public-private partnerships to our program in Peoria and relate how we have developed our long-term fundamental research discoveries into commercial successes using the authorities of the technology transfer legislation.

I would also like to describe a challenge to technology transfer that we have encountered as we have moved science to the marketplace.

My center is one of four USDA utilization laboratories which were among the most successful creations of Congress. Since 1938, our mission has remained to develop new uses in extended markets for farm commodities.

These laboratories have been involved in public-private partnerships for almost 60 years now and have changed American life in very significant ways: through the development of penicillin production, frozen concentrated orange juice, permanent press clothing, and many other familiar products.

But let me focus on our laboratory in Peoria and how we have used the technology transfer legislation. Since 1980, we have received 108 patents, and we have licensed 41 percent of these patents to the private sector.

But before an idea is patented and commercialized, new knowledge must flow from the science of discovery. It is from this fundamental work that practical ideas can be developed for commercial application. Without significant investment in developing new knowledge, the ideas and the technical basis of commercial opportunities would soon dry up.

This is one of my main points today. The only way to generate the seeds of technology is from fundamental research, and only with partners can this research be commercialized.

The key to our success in Peoria has been a basic understanding of the physical and chemical properties of plant polymers and how to modify them for practical application. I would like to provide some examples of how we have used directed problem solving research, which begins with fundamental knowledge, and have been brought to the marketplace using the existing technology transfer laws.

My first example is fluffy cellulose, which is used as a flour substitute imparting high dietary fiber and low calories. A simple, exclusive license was issued to a company in Cambridge, Minnesota.

With an annual market now exceeding 20 million pounds, the guarantee of an exclusive rights to this invention prompted that company to invest in the production facility and market development needed to launch this product.

A second commercial success, building on our fundamental research on enzyme modification of plant polymers, is Oatrim. This NCAUR invention continues to grow beyond 20 million pounds annually as an ingredient in low fat specialty food items. Oatrim is now being made and marketed under licenses by two joint venturers. Our ability to negotiate complex licensing agreements has been key to our success in this case.

Building on this same fundamental research, a third commercial development has been announced in the past year and was widely reported in the public national media. Z-Trim is a natural dietary fiber food ingredient, so named because it has zero calories. A special feature of Z-Trim was that it was invented under a CRADA, or cooperative research and development agreement.

By early on participation in the cooperative research process, the partner was permitted a first right of refusal to an exclusive patent right under the 1986 Technology Transfer Act.

Scientists at NCAUR have a history of developing novel materials from fundamental research which lead to an explosion of new products. One of the best examples is Super Slurper, the absorbent gel used in a wide variety of products, most notably disposable diapers.

Recently our scientists have developed another totally novel material which promises to have as many applications as Super Slurper. USDA has coined the name Fantesk for this technology. Its unique properties make it ideal for many commercial applications, and we have recently signed numerous licenses and CRADA agreements to develop the technology.

Additionally, our scientists have made important discoveries in recent years which are now about to pay off with a large-scale commercial application for a unique starch based, biodegradable plastic, and next you will hear Dr. Grant Brewen of BRDC describe this work and the commercial prospects of this invention under a very unique partnership arrangement.

All of these examples are based on fundamental research and involve partnering with the private sector, but let me turn to a difficulty we have experienced in technology transfer. The ability to get from a scientific idea to a commercial concept and then into a marketed product into the marketplace has been difficult, if not impossible, in some cases.

This problem is often referred to as Death Valley, where promising technologies die for a lack of capital needed for commercialization. In a way, it is a classic chicken or egg dilemma. Oftentimes a development facility is needed to produce enough material to convince customers that the product performs as advertised, but without a guaranteed customer, no one can afford the risk to build a plant.

We anticipate the NCAUR will soon have an important tool to bridge Death Valley. This summer we will begin a multi-phased renovation of our pilot plant which will provide flexible space for proof of concept work on NCAUR technologies.

Partnerships with the private sector will enhance technology commercialization through risk sharing, but exactly how this facility will operate under current technology transfer authorities remains to be established.

Let me summarize by saying that we look forward to continued successes in the science and discovery, the development of this fundamental knowledge, and ultimately bringing innovative products to the marketplace through public-private partnerships. It is in this way that we serve the American people by enhancing the Nation's economy and the agriculture sector, in particular.

Thank you, and I would be happy to answer questions at the appropriate time.

[The prepared statement of Mr. Johnsen appears at the conclusion of the hearing.]

Mr. Combest. Thank you very much, Dr. Johnsen.

Dr. Brewen.

STATEMENT OF J. GRANT BREWEN, PRESIDENT AND CEO, BIOTECHNOLOGY RESEARCH DEVELOPMENT CORPORATION

Mr. Brewen. Mr. Chairman and distinguished members of the subcommittee, thank you for this opportunity, and thank you, Mr. LaHood, for your kind comments.

It was 12 years ago that a group of businessmen and executives in Peoria, IL, and members of the USDA's Agricultural Research Service Laboratory, now called NCAUR, developed a unique concept for a research and development consortium. These individuals recognized that three important entities, the private sector, the Federal Government, and the State through their academic institutions, needed to work much more closely in order to transfer technology more efficiently from the public to the private sector where it could be successfully commercialized.

Unfortunately, at that time it was basically impossible for the private sector to carve out a proprietary position in intellectual property developed in the public sector. Through a considerable effort, led by the Peoria businessmen with the assistance of Mr. LaHood and his predecessor, Bob Michel, who at that time was the Minority Leader of the House, the Technology Transfer Act of 1986 was passed into law.

The vision of these individuals could not have been more on target. Today every Federal research organization is actively engaged in cooperative research and development agreements or CRADAs. There is even a Federal laboratory consortium for technology transfer, and the current administration has suggested that upwards to 20 percent of each agency's research expenditures should be dedicated to cooperative endeavors with the private sector.

Today, 9 years after its inception, BRDC and ARS have forged a partnership that is viewed as perhaps the most successful example of technology transfer in the Nation. This partnership in research and commercial development will become stronger with the Congress' support and continue to demonstrate that at least one American model can compete effectively with the established Government-industry coalitions that are so prevalent in Europe and Asia.

The partnership provides synergies that arise from the application of seemingly unrelated disciplines and, therefore, put non-U.S. companies at a competitive disadvantage; synergies that lead to efficient commercialization of ARS technologies; leverage for baseline financing during early stages of development; risk reduction on all of the partners' parts; and technology platforms for new business opportunities.

BRDC is privately owned. We are currently owned by seven corporations. They are: Agricultural Research and Development Corp.; Alexion Pharmaceuticals, a start-up biotechnology pharmaceutical company in Connecticut; American Home Products; Dalgety, PLC; the Dow Chemical Company; Mallinckrodt CInc.; and McDonald's Corporation.

Our purpose is to discover and fund technology that holds promise to make a significant impact in the international marketplace. BRDC, by virtue of its founding charter and current partnership with the U.S. Department of Agriculture's Agricultural Research Service, focuses its research and development activities on agricultural based technologies, with an emphasis on finding new opportunities for commercial exploitation of renewable commodity agricultural products, be they plant or animal based.

In this BRDC looks toward development technologies that will provide more environmentally friendly production of crops, new or alternative uses of commodities, and safer methods of production and delivery to the consumer.

To date, BRDC has funded 130 research projects at 37 institutions throughout the country at a cost in excess of $28 million. This research funding has resulted in the filing of over 230 patent applications, 49 of which have been allowed. Forty-three of those have been issued. Many of these patents, both the patented or about to be patented, have been licensed.

We have entered into 49 license and/or option agreements with the commercial sector and are finalizing negotiations on 4 additional license and option agreements.

The technology involved ranges from a promising therapeutic that is currently in phase I clinical trials for the human immunodeficiency virus, the causative agent of AIDS, which you, Mr. Chairman, referred to in your opening remarks; a new genetic regulatory elements for plant genetic engineering that has either been licensed to or is being evaluated by 80 percent of the world's plant biotechnology and seed companies.

Our funding has resulted in a technology that is current in the marketplace that predicts litter size in swine; an effective vaccine against cattle shipping fever, which will be introduced some time early in 1998; a method of cloning swine. You have heard of Dolly. We have a method of cloning swine, and a technology that I will focus on in my later comments, which is based on a starch/synthetic polymer that possesses the mechanical and strength characteristics of polystyrene and polyethylene, and yet is 100 percent biodegradable and compostable.

I have attached in my submitted comments appendices which summarize our financial statements from inception through year 1996, a list of the academic and Government laboratories with which we have done business, and a detailed list of all of the license agreements that we have executed to date.

What I would like to do now is take the remainder of my time and focus in on one example of where an organization like BRDC can be very successful in developing a synergistic effect between the private sector, the academic sector, and the public sector, and in this case, the laboratory in Peoria, NCAUR.

In 1995, the United States consumed approximately 15 billion, pounds of low density polyethylene, linear low density polyethylene, high density polyethylene, and polystyrene. Of this total, approximately 8 billion pounds were used for packaging, agricultural mulch, trash bags, retail bags, food service, food packaging, and so forth.

For example, before they switched exclusively to paper based packaging, McDonald's Corporation used in excess of 100 million pounds of polystyrene to serve their Big Macs, Quarter Pounders and french fries. If you multiply this by 3, you have a rough estimate of the volume of material that the fast food industry consumes each year.

Twenty years ago scientists at NCAUR began an extended research program to incorporate starches and other plant derived polysaccharides into petroleum based polymers. The objectives were price reduction and environmental considerations and new uses for agricultural commodities, not necessarily in that order.

Although successful in their efforts, the scientists produced a product that had, with a few notable exceptions, less than desirable mechanical and/or strength characteristics and a product that was not biodegradable, but what they did do in those 20 years was to build a platform of basic knowledge on starch polymer chemistry and other polysaccharide chemistry.

Several years ago scientists at the Dow Chemical Company, an original shareholder in BRDC, developed a family of synthetic polyesters that are completely biodegradable and compostable. These polyesters exhibit equal or superior mechanical and strength characteristics as compared to the materials I mentioned earlier. Unfortunately their cost made them commercially noncompetitive.

The Dow scientists tried what was obvious. They blended their materials with inexpensive fillers. They even tried starch. The result was a less than desirable product, and even as the Dow scientists will admit, they do not know starch chemistry.

They came to BRDC. We introduced them to the world's expert, who at that time was still an employee at NCAUR, Dr. William Doane and his group. Within 1 month, BRDC and ARS were working on a research project, and within 2 months we began to file a family of patents to cover the intellectual property that has been developed out of that cooperative research endeavor.

The Dow scientists have worked very closely with the ARS scientists. It is a true collaboration. As I speak, Dow has taken an exclusive license to the technology for the purpose of producing peanuts or loose fill packaging material, which represents about 150 million cubic feet of polystyrene every year.

BRDC and Dow have reached agreement on the terms of another license in which Dow will license back the technology on a nonexclusive basis for all fields of use. Dow has entered into a joint development project with a major third party to develop this technology for food applications.

Another one of our shareholders, and I think you can figure out who that is, is watching this technology develop very closely. They expect that if it is successful, that is, the development for food delivery, that they will be using in excess of 150 million pounds of the product within a few years.

There is a key point in this. Dr. Johnsen has mentioned the need in his written testimony of the development and the creation of a pilot plant at NCAUR. The Dow Chemical Company addresses markets that will use tens to hundreds of millions of pounds of their polyester resins. There are, however, dozens of applications for the starch polyester technology that will be limited to just a few million pounds.

The companies that will use this technology to develop these unique products are not capitalized to the point that they will be able to afford the development costs, and that is where BRDC and ARS and our partnership come in and play a significant role.

With the appropriate pilot plants, we can do the development work for those niche market applications of this very exciting technology. We consider it key in being able to demonstrate very conclusively the success of the private sector-public sector partnerships that we can, in fact, take new, exciting technologies that have formed a brand new platform for business opportunities, and to develop them into commercial products, not that we are going to go into business ourselves, but our intent is to create businesses, new businesses, in the Peoria and Midwest area.

In closing, I would just like to remind you that Government-private sector partnerships have been profitable to all of the partners and are profitable to everyone, particularly the consumer and the wage earner.

BRDC and ARS have demonstrated that this partnership can produce results that benefit every segment of our society, from the environmentalists to a Fortune 25 company.

And thank you. I will be glad to answer any questions you may have.

[The prepared statement of Mr. Brewen appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Dr. Brewen.

Dr. Wollenhaupt.

STATEMENT OF NYLE WOLLENHAUPT, STAFF SOIL SCIENTIST/ AGRONOMIST, AG-CHEM EQUIPMENT CO., INC.

Mr. WOLLENHAUPT. Thank you, Mr. Chairman and distinguished members of the subcommittee, for allowing me the opportunity to appear before you today to speak to you about the importance of continuing agricultural research and the exciting technological changes occurring on the farm today and in the near future.

My verbal comments here will be a synthesis of the submitted comments that you have before you.

Ag-Chem is an agricultural machinery manufacturer that markets a line of high floatation, self-propelled equipment used in the application of plant nutrients and crop protectants. Ag-Chem is the industry leader in bringing precision technologies to agriculture to accomplish site specific application of both plant nutrients and crop protectants.

I am here on behalf of the Fertilizer Institute, a voluntary, nonprofit association whose members represent agricultural equipment manufacturers, traders, retail dealers and distributors of plant nutrient materials.

The new technologies and practices I'm referring to include the use of global positioning satellites, digital field mapping, geographical information systems, grid soil sampling, variable rate seeding and fertilizer application, field computers for pest scouting, on-the-go yield monitoring, satellite livestock tracking, and computerized field history and record keeping, and these are just a few of the next generation of tools that are beginning to be used in agriculture today.

While the technologies have been glamorized in farm magazines and newspaper stories, precision farming is about farming with information. The new technologies allow us to collect detailed information about soil and crop conditions within a farm field, analyze the data, develop management strategies for specific sites within fields, apply crop inputs according to the needs of the site, and then gather more information through electronically aided crop scouting, and finally, yield monitoring.

In short, each farm field using precision technologies becomes a research plot. Crop, soil, and weather data collected over multiple growing seasons become the basis for adjusting important agronomic input, such as drop variety, plant nutrients, crop protectants, irrigation water, fuel, labor scheduling, and again, the list goes on.

The adoption of precision agriculture technology is beginning to proceed at a rapid rate. It is estimated that as many as 25 to 30 percent of our most efficient and productive farmers are utilizing various new technologies, including yield monitors, grid soil sampling, and variable rate nutrient application.

These numbers are consistent with a 1997 Purdue University farm supply dealership adoption survey that shows about 40 percent of the fertilizer and crop protection product dealerships are offering some form of geo-reference soil sampling and about 30 percent offering computer map controlled, variable rate, single product applications. These numbers are up about 20 percent from a similar survey in 1996.

All of this growth has created a large demand for equipment operators with computer and electronic skills and more college graduates in agriculture to assist farmers with the wealth of data that is created with the new technologies.

The rapid growth and adoption of these technologies has created a whole new job sector in agriculture for farm youth and college graduates. The demand has caught most of our land grant research and educational institutions by surprise.

The benefits of site specific farming on profitability for farmers can vary greatly from region, types of soil, and crops grown. For example, corn in Minnesota. The value added to site specific variable rate and management compared to a conventional program ranges from $5 to $29 per acre. In fact, new research is showing that the optimum nitrogen rate can vary from as little as zero to 180 pounds for optimum corn production within the same field.

Winter wheat in Washington. Results based on field research indicate again variable rate fertilizer application, improving profitability anywhere from 3 to $14 per acre.

Sugarbeets in the Red River Valley of North Dakota and Minnesota. Yield and quality results show a variable rate technology nitrogen management advantage over conventional single rate management, and these returns are over multiple years and multiple locations, range all the way from $48 to $75 per acre improved profit.

Potatoes in Idaho. Returns to risk in management were $368 an acre greater for a precision agriculture managed center pivot irrigation versus conventional managed pivot.

Many of the above studies report profitability for managing only one crop input variable. We know, however, that the more variables that are accounted for and managed in the growing season, the greater the profit potential. Hence, there is a great profit potential remaining.

The greatest benefit from site specific management may be from improved environmental stewardship. Targeting crop inputs to only those locations in a field where they are needed results in unnecessary over and under application association associated with only applying a single rate across an entire field.

Benefits of variable rate fertilizer application based on soil variability include increased fertilizer use efficiency, reduced nutrient overloading and surface water from soil runoff, and potentially the reduction of nitrate movement in groundwater.

Through site specific management areas more sensitive to leeching and surface runoff can be located and treated appropriately.

The use of precision technologies with automated data collection and the creation of electronic farm plans will help farmers comply with the increasing environmental regulations that are being proposed to be implemented at the far gate. Net gains in environmental stewardship will be achieved with less paper work and bureaucracy.

The earth's population is almost certain to double in the next century. One report estimates that the world's farmers will be asked to produce as much food in the next 40 years as they have in the entire 14,000 year history of agriculture production.

World population is increasing. Third World diets are improving, requiring more meat and grain to livestock. These are facts that must be faced by our agricultural production system and the Federal agricultural research community.

Mr. Chairman, as you well know, Federal funds are limited. With decreasing Federal budgets and numerous new research areas to explore, it is critical that public-private partnerships be expanded for new agricultural research areas.

It is important to maximize involvement, cooperation in the public-private partnerships with private industry, certified crop advisors, and others in USDA and land grant universities on research projects and educational programs.

To conclude, allow me to add that I understand that regarding reauthorization of the farm bill research title there is an overwhelming influence toward the status quo. While research grant recipients are unhappy that more Federal dollars are not available, they are generally happy with the current system and want to keep what they have.

I urge the committee to resist the rubber stamp approach to research reauthorization. There are many new and exciting areas of research in agricultural production that the Department of Agriculture should be capitalizing on and are not.

I believe precision agriculture is one of those areas, and I urge the committee to include H.R. 725, the Precision Agriculture Research Educational Information Dissemination Act, in its passage of agricultural research legislation this year.

Again, thank you, Mr. Chairman, and I would be happy to answer questions at an appropriate time.

[The prepared statement of Mr. Wollenhaupt appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much.

Mr. Martinell.

STATEMENT OF JOHN MARTINELL, PROGRAM MANAGER FOR AGRICULTURAL PROGRAMS, LOCKHEED MARTIN IDAHO TECHNOLOGIES COMPANY

Mr. MARTINELL. Mr. Chairman, members of the subcommittee, I appreciate the opportunity to appear today before you to provide this testimony. I am here representing the Lockheed Martin Idaho Technology Company, who operates the Idaho National Engineering and Environmental Laboratory, which is a DOE laboratory under contract with the Idaho Operations Office.

I am here to discuss some examples of collaborative partnerships that we have underway and provide some examples of things that might help future public partnerships flourish even further.

One of the areas in which the INEEL is focusing these capabilities is precision agriculture systems. As Mr. Wollenhaupt provided an excellent discussion of precision agriculture, simply put it is the integration of new space age information gathering technologies with traditional agronomic tools to better manage individual farming operations.

About 5 years ago as precision agriculture was just beginning to take hold, a group of USDA scientists and university scientists, along with a few farmers and individuals from industry, approached the INEEL. They were seeking a broader range of multidisciplinary expertise and technologies to begin adapting precision agriculture to crops grown in the Pacific Northwest.

Less than 6 months after that initial contact, this unique partnership developed, tested, and implemented the first ever potato yield monitoring and data management system on a full-scale production farm in Idaho.

This partnership has evolved into an interagency, public, private sector collaborative effort referred to as the National Site Specific Technologies for Agriculture Project. This project is a comprehensive systems project that includes integrated research and development for site specific technologies, such as yield monitors, geophysical sensors for invasive soil characterization, remote sensing and other environmental characterization techniques, and information management tools required to support farm management decisionmaking and operations within the context of the agronomy and ecology of the cropping system.

On November 2, 1995, partly as a result of the success of this project's collaborative approach, the Departments of Agriculture and Energy signed a memorandum of understanding that provides a framework for the two departments' scientists and engineers to prepare U.S. agriculture for competition in the global marketplace and to reduce agriculture's reliance on fossil fuels and other energy intensive inputs.

The purpose of the MOU is to stimulate greater cooperation and coordination between the departments for the benefit of the agriculture sector. This partnership couples USDA's expertise in plant breeding, biological pest control, soil and water conservation, and other areas, with DOE's expertise in systems integration, physics, engineering, and information sciences.

The complexity of precision agriculture demands the attention of a wide variety of disciplines. No one institution could ever expect to attract this stable of disparate entities necessary to design the model for precision agriculture systems. Therefore, a novel partnership organized around customer needs and system requirements is essential to realize the significant gains in building a precision agriculture system.

These partnerships often result in atypical alliances between those well established in the agriculture sector and those who are relatively newcomers to agriculture, such as the national laboratories, high technology computer and software manufacturers, and aerospace and other defense related industries.

Fostering these novel partnerships is not only critical to the advancement of precision agriculture, but it is also likely to generate new resources and capabilities that have never before been available to the agriculture community.

Reauthorization of the agriculture research title presents an ideal opportunity for further integration of public-private sector partnerships that expand upon USDA's current portfolio for agriculture research to develop precision agriculture systems.

Existing USDA programs for agricultural research and development have evolved to become very effective in addressing specific elements of the agriculture community. However, the need for a collaborative information intensive effort to integrate precision agriculture research will require innovative applications of systems integration and public-private sector partnerships.

Such innovative approaches would need to consider the following elements:

Expand the applications of systems analysis and engineering techniques to fully define, prioritize, and coordinate necessary research and development with farmer and supplier requirements fully integrated.

Encourage the participation of all elements of the research community, including USDA, other Federal and State agencies, National Laboratories, universities, and the private sector.

Aggressively leverage the private sector investment potential and identify additional Federal funding from nontraditional sources which share an interest in the potential benefits of precision agriculture.

Establish the means to identify funding for specific initiatives of national scope in large, consolidated blocks that will enable multiple jointly funded institutions to work together.

And demonstrate clearly defined end products with quantifiable results and outcomes in a definable period of time with full accountability to USDA and other sources of funding.

Without some type of mechanism that meets these requirements, the agriculture and research communities will be unable to fully realize the benefits of systems integrated, multi-disciplinary public-private sector collaborations.

As reauthorization of the agricultural research title moves forward, the INEEL looks forward to working with the subcommittee and stands ready to offer its expertise in helping the agriculture sector position itself for the 21st century.

Thank you, again, for the opportunity to present this testimony, and I welcome questions.

[The prepared statement of Mr. Martinell appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Mr. Martinell.

The chair would recognize the ranking member of the full committee, Mr. Stenholm, for an introduction.

Mr. STENHOLM. Thank you, Mr. Chairman.

I appreciate your indulgence in this. Kent Nix comes from Dawson County, and you used to have the privilege of representing Dawson County. Many still speak very favorably of your representation, and I have enjoyed this privilege for the last several years. I appreciate your letting me introduce the voter in the 17th District, instead of the voter in the 19th District this morning.

Kent Nix is a cotton farmer, grain, sorghum, cattle producer in Dawson County, TX. He was past president of the Lamesa Cotton Growers and in his testimony, members of the committee will hear about a very unique, innovative, public-private research project that has been going on now for several years and doing interesting research. Mr. Chairman, I commend you for holding this segment of these very important hearings on agricultural research, and looking at ways in which we can take scarcer dollars and maximize them to the benefit of producers in various regions of the country.

And with that, I am just delighted to welcome you to the committee Kent, and we look forward to hearing your testimony.

STATEMENT OF KENT NIX, CHAIRMAN, AGRICULTURAL COMPLEX FOR ADVANCED RESEARCH AND EXTENSION SYSTEM

Mr. NIX. Well, thank you much, Congressman and Mr. Chairman. It is good to see you again, and distinguished members of the committee.

I would like to also introduce Mr. Foy O'Brien, who is president of Lamesa Cotton Growers, and he will be here to help respond to any questions you might have.

The Lamesa Cotton Growers is a regional producer organization that dates back to the 1950s when local agricultural leaders organized to insure that a USDA cotton classing office would remain a part of the infrastructure for cotton in our area.

In 1980, Lamesa Cotton Growers reached agreement with USDA to build a $1.7 million classing facility. This was something that the growers voted to assess themselves on a per bale basis to underwrite.

It was equipped with the latest technological advancement in cotton classing at that time, high volume instrumentation. Under a cost share arrangement with the Federal-State Market Improvement Program, our organization purchased 10 HVI lines, making it the world's first fully automated cotton classing office.

Our early commitment to this new method of classing paved the way for HVI to quickly become the standard in our industry, and it has truly revolutionized the cotton industry.

We retired the debt on the Lamesa classing office in 1990, and our board of directors agreed to invest the cash flow from the rental of that building into agricultural research.

AG-CARES is a cooperative effort involving Lamesa Cotton Growers, the Texas Agricultural Experiment Station, and Texas Agricultural Extension Service. We have now completed our seventh year of operations and submit with this testimony 7 years of annual reports that will document the results of that.

Lamesa Cotton Growers provides 240 acres of land that is cash leased by LEPA irrigation systems and operation funding. The experiment station provides a system plan and a team of research scientists to monitor the interactions within systems.

The Extension Service provides on site management and extension capabilities to conduct field trials, tours, and reports.

Various farm inputs are contributed by numerous local businesses and private industry.

One key to the success of our operation is the steering committee, made up of members from each organization. The committee reviews past years' results, identifies research priorities, and communicates who does what for the next year.

In 1994, USDA Superior Service Award for Scientific Research was awarded this AG-CARES farm system group. Over time this approach has developed into a very close relationship among the organizations. Each group is accountable to the other for results.

I offer three reasons why we feel AG-CARES has been successful and why we're working on a long-term agreement to continue its operation.

No. 1 the operation of the farm has produced results immediately adaptable by our local producers. This research is conducted where we farm, on our soil types, under our growing conditions. Systems that work here we know are adaptable to our own operations.

No. 2, the farm generates some of its own research priorities. When production problems arise from implementation of the new systems, these problems then become the next research priorities.

And, No. 3, AG-CARE's location allows for quick response to changing conditions.

What is in our future? Extreme yield variations are documented within the short distances across the different cropping systems. New precision monitoring devices, much of what you have heard described here by previous panel members, will be used to isolate and research the factors responsible for those variations. This could allow the precision application of crop inputs that could dramatically improve yields.

This precision farming project is planned to begin in 1998, and we expect that it would increase the number of private companies who will be participating with us at the AG-CARES project.

Again, we would like to point out our unique funding situation. Without the income that is provided Lamesa Cotton Growers by the rental of the Lamesa cotton classing office, we would not be able to provide that location and continue to participate in the project.

Likewise, public funding sources are necessary for the experiment station and the Extension Service to fulfill their commitments to the project, and private industry always is welcome to participate at AG-CARES.

However, we do feel that it is through the public funding of agricultural research that producers can be assured of objective information and results.

Mr. Chairman, I do remember back with you when these beginnings were in Dawson County in the 19th Congressional District, and we appreciate your support and friendship over the years, and as the Congressman has pointed out, in the 17th Congressional District now, I can assure you that Congressman Stenholm has been on the ground there, and he understands the linkage that exists between Lamesa cotton classing office and the AG-CARES research project.

Congressman, your involvement has been crucial in maintaining both of these projects, and we greatly appreciate both of your efforts to protect something that Lamesa Cotton Growers has worked hard to build over the years.

Thank you very much, and I'll be happy to respond to any question.

Mr. COMBEST. I was going to clarify the record after Mr. Stenholm's comments, Mr. Nix, and you may not want to claim either one of us, but I felt a little better about that following your final comments. Thank you.

Dr. Brewen, I thought I wrote this down correctly, and then I went back and looked back through your testimony. I thought you said toward the end that the relationship in regards to the way you all have done that, and there are some very impressive things coming out of there, I thought you said it was profitable to both the Government and private sector, and I wanted to make sure I got that.

I looked back, and I believe you said the Government-private sector partnership benefit everyone. You maybe did say profitable, and my question was going to be how does the Government profit, but there is a point to that.

I have wondered, and I would like to get maybe your comments on this. Sort of as a stage setting, I think we are charged on this subcommittee and eventually the full committee and eventually the entire Congress with doing what we can do to make certain that we maximize the amount of money that we spend on research, and we all know we are not going to have as much money as we have had at some times, and we may have substantially less.

But in order to make certain that we are good stewards of the taxpayer dollar, I think it is vital that we do not just recognize we have done this for 20 or 30 years. Actually we have not had a reauthorization, I think, in this bill in 20 years. We are going to look at it. We are going to throw everything out on the table and look at it.

It does not mean by investigating it that necessarily everything about it is bad, but nothing is off limits. We are going to see what can we do better than we might have been doing in the past, and I think that is the only responsible thing we can do.

We may decide a lot of it is great. We may decide a lot of it is not any good at all, but having said that, I have been interested in, and this would be very difficult to implement, but it is something I think we ought to look at; I have been interested for a number of years in looking at the role of the Federal Government's investment into a lot of things, weapons systems or research or whatever, to see if we could move to the role of the Federal Government sort of as a venture capitalist.

Dr. Johnsen, you mentioned that there were some things that were evolving from some research, that you could not find anyone that was able to go in and develop.

But if Government invests in a project that has potential, it may not work; it may fall flat on its face. Unfortunately, one of the things we are going to have to change if that is the case, the people who invest that money may spend the next 6 years before some congressional committee asking why they did it.

But if it works, which it does in many instances, somebody makes a profit from that. Somebody then begins to commercially develop that. The private sector takes over, and they go out and potentially can make a lot of money.

Well, I think we maybe should explore the idea of the Government acting as a venture capitalist, and if, in fact, a project, a risk, an investment that is made hits, that there is some opportunity then for the Government to recoup their investment, plus possibly interest.

I do not know if that will work or not, but could you give me your thoughts about that?

Mr. BREWEN. I would be glad to comment on it. The gentleman sitting at the other end of the table, I am sure, has some comments because AARC is a venture capital firm, and it is the Government.

The arrangement that BRDC and ARS have is that if a profit is made, the profit is shared between us. It is a partnership. The sharing arrangement is 50–50. In other words, every dollar of income that BRDC generates through its licensing activities is shared 50 cents to BRDC, 50 cents back to the ARS, and through those channels, the inventors, which was part, I believe, of the Technology Transfer Act, that Government inventors are allowed to recover some of the income that is generated from those inventions. That money does come back to the Government.

We have an AARC grant. The BRDC is a recipient of AARC funds, and the provisions of our agreement stipulate that we will share all future revenues, one-third, one-third, one-third, one-third, going to BRDC, one-third to ARS because it is ARS based technology, and one-third to AARC until we have paid back the original AARC investment, and then they get a straight percentage of income forever if that technology is commercialized.

I agree with you. I think the Government should get into business.

Mr. COMBEST. There are some areas that that is done in, in some other areas that are non-agricultural, but I do not think it is as widespread as maybe the potential exists there for it to be.

And everyone does benefit when something works. I presume this is one of the products. I would say this is a plastic fork, but it is not.

Mr. BREWEN. We did not make that one, but I can assure you that the ones we make are better than that.

[Laughter.]

Mr. COMBEST. Well, I do not know. This one has got an ear of corn on it. So I figured the corn people——

Mr. BREWEN. That is made out of corn starch. I am certain of that.

Mr. COMBEST. Mr. Dooley.

Mr. DOOLEY. Well, when we look at this again it is that the overriding issue here is how do we maximize the investment in research or maximize the Federal dollars that are invested in research, and we do that by insuring that we are going to be identifying the priorities which will benefit the agricultural sector in our rural communities, and we also have to consider how do we leverage additional private investment.

And I think that is what this panel has been focusing on a little bit in terms of how do you develop those private-public partnerships, which again leverage the Federal investment, the taxpayer dollars, by encouraging also the private sector investment.

And from what I gathered when I was listening to most of you talk out there is that outside of maybe having more dollars on the public side that you could invest, that it appears that things are working pretty well, and I guess my basic question to you or initial question is: what would you have us do differently in the reauthorization to enhance, you know, this public-private partnership?

Does anyone have that they would do specifically?

[No response.]

Mr. DOOLEY. Well, moving to a little bit different issue then, I think that, Mr. Wollenhaupt, the bill that you brought up, the H.R. 725, I think, poses kind of an interesting case study for us to look at, and I make this statement because some of us, and Mr. Brown, in particular, have long been champions where we have to be careful in terms of congressional actions which specifically earmark funds that are targeted sometimes even more specifically than what H.R. 725 does for precision agriculture.

And I guess my first question as it relates to this would be to Dr. Robinson. Is there anything that would preclude an NRI funding under a competitive process, a grant that would deal with precision agriculture?

Mr. ROBINSON. No, Congressman Dooley, there are no provisions, and in fact, in a review of our NRI process and projects which have been funded, just in 1996, for example, we made five awards for programs relevant to precision agriculture, for a total of about $914,000.

Additionally, Congressman, there is also about $4.3 million that is designated for and related to precision agricultural work on the part of the Agricultural Research Service. So both the extramural and intramural funding organizations of the Department are concentrating funds on those areas.

And in fact, the Department of Agriculture has long been a proponent of any type of increased precision and the use of inputs in agriculture both from an environmental point of view, as well as from a production point of view.

The Department, however, does oppose H.R. 725 for some of the reasons you laid out, and that is the earmarking of funds because of the huge demand by different interest groups, and scientific communities, and market areas for the limited funds that are available. The Department feels it should be more in a competitive relationship.

The opposition is not because of precision farming, because the Department is a proponent, but because of potentially what earmarking could do to that program.

Mr. DOOLEY. And I say it is kind of an interesting case study because, in effect, the reason why it is even a viable commercial application today is because some of the investment really in defense and in our space program that allowed us to have the global positioning satellite technology, in the first place, a lot of the investment that was done early on by maybe the Soil Conservation Service in the mapping of our soil types, which has made this a technology.

But I get to the point, too, here that you have some of those investments in really basic research where there was not a commercial application at that time, which was an appropriate Federal investment, and I guess my concern is now should this ever be elevated as a specific priority for NRI grants, and the reason I say that is that our objective here from a Federal policy making standpoint is to insure that we are maximizing the taxpayer dollars, but also have an obligation that we are not displacing private sector investment.

And as I understand, Mr. Wollenhaupt, you said we already have 30 percent utilization of this precision planning or agricultural technology out there. That obviously communicates to me, and I am a farmer myself, that there is a commercial application that is being marketed because these companies can demonstrate that there is value.

So I just need to understand from you what is your compelling argument in terms of why we need to specifically identify and earmark funds for this when we already have an industry which is growing very rapidly, as your comments, 30 percent adoption of this technology. Why is not this earmarking going to provide Federal funds to this specific task, which actually could displace what would be private sector funding?

Mr. WOLLENHAUPT. I do not see that as a displacement. We have technologies, yes. They are commercialized, yes. They are showing profitability. Hence, commercially we are involved in those markets, but from an agronomic perspective, the prescriptions or recommendations that we use at the farm level are basically from our land grant institutions in ARS, and that research was done in the 1950s and 1960s and early 1970s. That was the heyday of that work.

We have new technologies to deliver products more correctly than we ever have before, but we have recommendation based, based on 1950s and 1960s technology. In recent years, and I was a former university researcher before being in the industry side; in recent years we have seen a shift in our research emphasis to water quality and sustainable issues, which are very important, but that has been at the expense of the production work that was done in the 1950s and 1960s.

Right now we have before us technologies that will improve profitability and environmental stewardship, and yet that recommendation basis that is going to be administrated through these technologies is not there today, and we need to have that public sector or we need to have those recommendations, those strategies updated through our land grant and agricultural research community.

Mr. DOOLEY. Yes, and I want to make it clear. I am a strong proponent of this technology and the adoption of this type of management technique, I guess it would be, and the research that is needed. My only concern is that we have to be cautious that we do not earmark funds that would restrict the ability of USDA to respond to pressing challenges.

And I will use one example that is very important to agriculture, which is methyl bromide where we have a date certain when we are going to lose this product, which is very important, and I think people in the industry just have to be a little cautious about, you know, earmarking, creating an obligation which restricts the ability of the Department, Congress, the industry, to respond to some specific challenges.

So I appreciated your comments.

Mr. COMBEST. Mr. Lewis.

Mr. LEWIS. Thank you, Mr. Chairman.

Dr. Robinson, only $914,000 will be spent on precision agriculture out of $96 million? That does not seem to be a high priority there.

Mr. ROBINSON. Congressman, the $914,000 is a representation of the successful awards through the NRI last year. It does not necessarily represent the notion that only $914,000 is the appropriate amount for the NRI, but in fact, there are several categories and the large plant science category is one of those that precision agriculture applications would be considered under, and that is several million dollars.

So there is not an attempt here to restrict. It is just if there are more competitive awards in this area, they would certainly be competitive and considered.

Mr. LEWIS. OK. And I think what the legislation actually says is that there is really no earmarking there. It says where appropriate. It encourages the Secretary to look at precision agriculture.

I want to ask Mr. Wollenhaupt. I understand your company has dome some research and work with livestock waste and precision agriculture. Would you expand on the benefits and concerns you have found so far in this work?

Was this work done in cooperation with farmers, industry, or universities?

Mr. WOLLENHAUPT. The work that we have done in terms of developing equipment, utilizing technologies to do variable rate of livestock waste application has been a joint effort. The demand or need was created from the private sector, and when the need came to us, there was work between the custom applicator and a fertilizer dealership that came to us.

We engineered the technologies that we had for other products into a device that would do variable rate application. In March of this year, this technology was prototyped in North Carolina with livestock, with hog waste, very successfully, and the result was not only was the material injected below the soil surface so that there were no nuisance or odor issues, but also the material was applied in a manner that the rate was applied according to what the crop needs and soil conditions were in that field. So there should be some environmental stewardship there.

So it was a joint effort, although in this case Ag-Chem probably invested substantially on the R&D side of it.

Mr. LEWIS. I want to get into the environment a little bit. I think precision agriculture has a tremendous benefit to the environment.

In your testimony, you mention how precision agriculture technology has potential environmental benefits. Would you expand on how these new satellite systems and electronic tools can help agriculture reduce farm runoff and improve water quality?

Mr. WOLLENHAUPT. All right. Maybe we need to back up here. In our research through the fifties and sixties, we focused on trying to apply the appropriate rate of crop inputs based on field average types of numbers. Today with our technologies we have the ability to target materials within the field boundaries, and in fact, as we've gone out and done sampling, we've found nutrient levels very dramatically, and when we look back on what we've been doing and in many cases are still doing, we're over or under applying input, you know, in various locations in the field.

With the positioning technologies, the use of computers, the use of mapped information, spending more time collecting data, we can direct those inputs where they're needed and where they will benefit the crop, and at the same time we believe it is more desirably beneficial to environmental stewardship.

Mr. LEWIS. Thank you.

And I think another important thing about H.R. 725 that I would just like to mention is the fact that it links the research and the technology that is developed with educating the producers and getting that information out, and of course, that is what the bottom line really in my opinion is all about.

Mr. WOLLENHAUPT. I agree, and we find from the industry perspective education is the big limiting factor right now. Potential risk associated with adopting the new technologies can only be addressed through strong educational programs.

It has even gotten to the point that in the company I work for we have invested this past year $3 million in building an education facility not only to train people on our technologies, but actually to begin to address the basic agronomics of the data that is being collected by these customers, whether they are dealers or whether they are farmers.

And to me that is a role that extension and the land grants have traditionally been very strong in, and we need them to step back to the table and address the productions issues as well as they have on other issues in recent years.

Mr. LEWIS. Thank you.

Mr. COMBEST. Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman.

Mr. Martinell, your cooperative program between the lab and the Department of Agriculture is perhaps a model of what the future may hold. Can you give me a general indication in addition to the precision farming initiative of the kinds of things that you think the lab could do in helping agriculture in other ways?

Mr. MARTINELL. I thank you, Mr. Brown, for the opportunity to provide you that information.

The INEEL, as one of many of the Department of Energy's laboratories, has developed a capability that stems from support of the Department of Energy's mission in energy security, environmental stewardship, national security and basic science and technology.

We have at the INEEL developed expertise in massive data handling systems which are an inherent part of, a necessary component of success in precision agriculture. As the farmers and agribusinesses manage the information coming from these variety of new sensors and control systems, they need to be able to discern what's important in that information and act accordingly with their management strategies.

So information science is one such type of technology.

In addition, systems integration and engineering is an integral part of the Department of Energy's capability associated with the many large scale projects that the Department has been charged with in the past. That capability assures focus on the real issues at hand associated with large projects, allows for a basis for technological prioritization within the myriad of issues that exist in large kinds of systems, et cetera.

So that is an additional capability that I believe can augment that which exists within the current agriculture system.

I think the third area, and the final one which I would like to address, has to do with advanced sensors and control systems and strategies, those associated with such things as robotic sampling and spraying, which could replace the potential for some of the harmful and costly effects of human based systems which currently are used for those kinds of operations.

Those same technologies are essential to the clean-up work that is being done within the Department of Energy at the present time. So there is an excellent opportunity for leverage within the agricultural sector.

Mr. BROWN. I also serve on the Science Committee which deals with the Department of Energy's research program, and your testimony conceivably could be of considerable interest to that committee to indicate the future prospects for the Department of Energy labs.

If I may be permitted to reminisce briefly, I was a part of the first revolution in precision farming which took place about 60 years ago. And down in Imperial Valley we had been leveling land with what we called a Fresno, which was a blade with a handle on it drawn by a mule, and we leveled a lot of land down there back in the 1930s, and then we went to a very long scoop kind of a thing, 30 or 40 feet long, drawn by a tractor, which of course could do a much finer job of leveling the land.

I used to build those things in my first job out of high school, and that was what really allowed them to begin grading land down to a precision of a fraction of an inch per mile, and now we are just using a different technology to accomplish the same thing.

If I have another moment or two, I would like to ask Dr. Robinson about the BARD operation, if I may. That is a rather old program. It is one that I frequently refer to as an example of an excellent program, but it gets relatively little publicity.

Do you have, Dr. Robinson, annual reports or descriptions of the work that BARD is doing that would be available if requested?

Mr. ROBINSON. There are reports that we can make available to you, yes, sir.

Mr. BROWN. I would like to request those.

Mr. ROBINSON. OK.

Mr. BROWN. BARD, of course, is only one of, I think, two or three corporations or operations of that sort. BIRD, the Bi-national Industrial Research Program, and I think there is another one dealing with the fundamental research, and these are rather unique in that they are funded through the interest from an endowment and, therefore, do not get exposed to the annual congressional scrutiny and criticism that would come about if they were funded from annual appropriations.

Do you think that system has been working adequately, or would you prefer to be subjected to the mercies of Congress every year? [Laughter.]

Mr. ROBINSON. Well, the endowment certainly provides a continuation of funding through earnings to support competitive research projects of interest to both countries, but as I stated in my testimony, starting in 1994 some additional funds were provided above and beyond the earnings of the endowment from both Governments.

Mr. BROWN. Do they go through your budget?

Mr. ROBINSON. Yes, it does.

Mr. BROWN. Do you think that kind of approach could be used with other countries? And I am thinking specifically of Mexico where we also have a bi-national research foundation that is not nearly as well funded as Israel.

Mr. ROBINSON. Well, certainly this kind of arrangement could be used for a number of programs. I guess the point for consideration is whether it should be authorized specifically and appropriated specifically to that program.

Mr. BROWN. As contrasted with having a foundation or an endowment that could?

Mr. ROBINSON. Well, or in addition to, as is the case with BARD, to the original endowment that was placed there by both Governments.

Mr. BROWN. Mr. Chairman, now may I have permission to submit additional questions to the witnesses in writing?

Mr. COMBEST. Certainly. All members may, and I will just mention to all of the members of the panel, as the hearings go forward we will have several others. There may be other information we would like to come back to you for, and certainly the gentleman may submit those questions.

Mr. LaHood.

Mr. LAHOOD. Mr. Chairman, you had mentioned the idea of venture capital and how we can recoup some of the investment that we make, and one of the things that I think the research lab in Peoria has done with the invention of penicillin many years ago probably improved the health care of our country dramatically, and more recently the use of Oatrim for dietary purposes also, I think, has been a big benefit to the health care and the health of many Americans.

I know that is not exactly what you were referring to in terms of getting something back, but I do think the kind of research that goes on at this lab and other labs around the country is of benefit in so many ways that perhaps we do not really recognize.

And I do appreciate your holding this hearing and allowing a couple of people from my home community to testify today.

Let me just ask all of you: aside from more money, which all of us would very much like to invest in research, what should we be doing in terms of structuring language to assist all of you with the work that you do?

I know that our lab in Peoria has collaborated so well with the private sector, and there has been a good investment with private dollars with public dollars, and I am sure that your top priority, if you could list it, it would be additional resources from Washington, DC.

Set that aside for a minute, and tell us what we should be doing in terms of structuring language to really assist with the kind of great research that has been going on for so many years, and any of you can respond.

Dr. Johnsen?

Mr. JOHNSEN. I think that the legislation in 1986, Federal Technology Transfer Act, which authorized and made clear the relationships that could take place between the public and private sector, had as much to do with some of our successes as anything beyond infusion of money.

Just making it known to the private sector that they could, in fact, engage in cooperative research with us, that we, in fact, could exchange proprietary information and we could keep it confidential, well, for the life of the information. There is no expiration date on that kind of information.

So authorization that clarifies the relative roles and responsibilities and the authorities of the public sector participant and the private sector participant are extremely important in these leveraging relationships and these sort of marriages which take place, which last for some periods of time.

Some of our technologies take more than a decade to go from the time we say we have something that is near commercial to actually having them be commercial, and so we need a clarification of what authorities we have as a Federal player in the partnership, and also what kind of expectations are of the private sector, much the way in which the Federal Technology Transfer Act of 1986 just clarified relationships and authorized those relationships to be formal and legal.

So that kind of discussion is something I think would be appropriate to take place.

Mr. BREWEN. Congressman LaHood, I would like to pick up where Dr. Johnsen left off.

It is my understanding that the ARS cannot manufacture in one of their facilities an article for sale. In other words, if BRDC and ARS wanted to go into their pilot plant and to make a prototype device using one of our technologies and then test market it, we could not do that.

I think that a little bit more flexibility is required. The Technology Transfer Act of 1986 provided a wonderful opportunity, but I think in order to expand upon those partnerships, and this addresses perhaps not directly but indirectly the Chairman's question, is it appropriate or can the Government get in the business?

I think here is an opportunity without getting into the business in the sense that a Dow Chemical Company is in the business, but in the sense of being a partner in a business endeavor. AARC is in it. Why not ARS as well?

They have developed the base technologies, and one of those, which I consider to be extremely promising, was developed out in Peoria, and I think we have the opportunity there to apply that technology to niche market opportunities and create small businesses.

But before you can find the capital to support a business, you have to be able to demonstrate that you have got a product that can sell, particularly in this business arena.

Remember we are not in the biotechnology pharmaceutical arena where everything that shows promise someone is willing to throw money at because the return is usually 10 million to 1. We do not have that opportunity here.

But if we had the freedom to operate, then I think that opportunity will present itself.

Mr. ROBINSON. Mr. LaHood, perhaps I can provide a more general response to your question because I think it is an excellent question, and it relates to the point, I think, that the chairman made about venture capital in the research budget.

The way, quite frankly, that we look at many of our research programs and extension programs are in a venture capital framework because, bottom line, they are funding activities for the public good that are not yet to the point of being funded under a profit motive by the private sector.

So there is a lot of public good research and actually a lot of public good education programs that are funded by virtue of the authorization that you are considering in this committee today, which is a very important one.

I would suggest that one of the things that very often is very important, and it was discussed also at the Senate hearing with regard to the reauthorization, is flexibility. Flexibility of the Department, and I think Congressman Dooley referred to this in his remarks, to be able to move to high priority areas that the Department identifies with stakeholders and moving forward to address the most significant areas are real issues that are critical to the future.

Thank you.

Mr. ARMSTRONG. If I could just add to that, Congressman, I think part of that flexibility, and, Mr. Chairman, this gets back a bit to your point of functioning as a venture capital firm, which is what we do at ARC, and that is provide the opportunity for that Government money to be used in equity investments, which is in large measure what we do.

That attracts private capital like nothing you have ever seen. The debt to equity ratio looks good, and again, we have got a 3½ to 4 to 1 matching rate with private capital, and in 5 of our companies we have seen them get multimillion dollar infusions because they have looked at us; the private investors have looked at us, the due diligence that we did, and essentially got the USDA seal of approval on it.

But it is my understanding, and I may be incorrect in this, that we are the only or certainly one of the few Government organizations that has the capability to make equity investment.

And, Mr. Chairman, with respect to your point of how do you get out of that, how does the Government recover its money, in every such investment that we do, of course, we are looking at two strategies. Either the company is acquired, in which case we get bought out and recover the money time a multiple, or the company goes public, in which case we cash out times a multiple.

But, in addition, we write in an exit strategy. So we are securing the Government's investment, and if it fails, it fails. Patience and bravery are the watchwords of venture capital. Eighty percent are going to fail, but 20 percent are going to pay all the bills for everybody.

So to get back to your question, that ability to make equity investment with Government money I think is a key factor.

Mr. COMBEST. Mr. Stenholm.

Mr. STENHOLM. As we said about reauthorizing the research title of agriculture, the questions have already been asked about how we set our priorities, how we modify our current research to make it more efficient, how we can maximize the shrinking funds and the concept of public-private sharing. But in the general tenor of you and the other witnesses before this subcommittee, it seems that we are looking at how we can make a good thing better.

There seems to be a general consensus that agricultural research has performed a very vital, important function and has done it well. Now, with the era of farm programs on the downhill slope, a competitive global marketplace, and then research, should we emphasize new crops, better crops, better livestock, environmental benevolence, this area of marketplace research, the consumer? Mr. Wollenhaupt, your comment on education was right on target because those who oppose technology, are doing a very good job of getting into our school systems with anti-technology education at a time when we really need to be more diligent. I could not agree more with your comment.

I have a general question to satisfy my own curiosity. From your own personal vested self-interest perspective, if you had to score agricultural research on a scale of 1 to 10, with 10 the highest, what is needed to prepare us for the next century? I'd like to hear first from Dr. Armstrong, then each of you can give me a number.

Mr. ARMSTRONG. I am not sure whether to thank you for the opportunity to respond or not, Congressman. [Laughter.]

Mr. STENHOLM. Well, it is not very difficult. You have just got to say 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10. No editorial comment.

Mr. ARMSTRONG. OK. I am sorry. I will choose 8.

Mr. ROBINSON. You may get a lot of consistency, Congressman, because the number that popped in my mind was 7 or 8 because of the current return to the investment in research being 30 to 50 percent, and for every dollar of research or Federal monies going to research or education at the land grants, it is leveraging another $4 or $5. So there is a significant return to those investments.

Mr. JOHNSEN. I agree that we are in that 7 or 8, but I think that one of the things we also need to do is we need to place agricultural research in the perspective of national Federal R&D. When you look at the kinds of discussions that are going on in Federal R&D policy, national science and technology issues, one is struck by the absence of the mention of agriculture in that discussion.

So while we are actually doing pretty well feeding and clothing this nation and managing and performing stewardship of the resources, we do not have our dog in the fight about where the Federal research and development issues are going, and I think that we need to get agriculture into that fight as much as any discussion about whether we are 7 or 8.

We are 7 or 8 among ourselves, but where are we on Federal R&D research? I would say we are 2, 1 in the big picture, and that is a concern of mine in the big deal picture.

Mr. BREWEN. Congress, I assume that this is a priority score. I would have to give it a 9. I disagree with my colleagues here.

We are pretty comfortable with agriculture. We are well fed. We are well clothed. What do we need? Most of us are overweight.

But if you look around the world, we have got a real problem. Probably 50 percent of the disease worldwide is caused as a result of malnutrition, and sooner or later we are going to have to help feed the world.

A lot of wars have been fought in the past over food. Food is a major staple in life, and this country may not have the capability of exporting grain to feed the whole world, but we certainly have the capability of exporting the technology.

We lead the world in technology, and I am concerned that we may fall behind where we currently are or at least the pace at which we are developing technology, and if we do, who is going to develop it?

I think this country has a responsibility to continue developing the technology. As a person who licenses technology, I do not have a problem with granting a license to a foreign company. If I have a piece of technology that will enable someone to grow a better corn in the Sub-Saharan region, I will grant them a license. I will generate revenue that way. I do not necessarily have to sell them corn. Sell them the technology, and help the rest of the world.

That is a little bit idealistic, but I am serious about this. I think this country really is at a point with agricultural research that is make or break, and that we should not become too comfortable with our own standard of living.

I obviously have not missed many meals, but there are a lot of people out there that have, and we have the technological capability of avoiding a major disaster in the future.

Thank you.

Mr. WOLLENHAUPT. With respect to food and fiber production in the very near future, I would give us a rating of about 5 and losing out very rapidly as the technologies coming into play that do not have the basic agronomic research principles behind them to support them.

Mr. MARTINELL. I would rank the fit, if you will, Congressman, as about a 7. I second the comments that Dr. Brewen made regarding the importance of agriculture research from a priority standpoint.

Agriculture is the world's largest industry. The population pressures that are upon the world will result in significant potential environmental impact associated with feeding that population base unless we are able to develop and apply the technology to support the production necessary to do so.

I think that opportunities exist for leveraging such technologies more prevalently. It is a matter of providing the opportunities through opening doors for partnerships to do that.

Mr. NIX. Congressman, I guess being the only producer on the panel and, I guess, the only end user of technology generally, the number that comes to my mind is about a 6, and I guess I am concerned that as producers we often hear a lot more about that technology than we actually see available to us immediately.

And I can tell you that from the farm perspective, we need technology to start impacting our bottom line immediately, within the next few years, and I know there is a very delicate balance between applied and basic research, but we need a little bit less hype and more specifics to get to the bottom line of producers.

Mr. Chairman, your comments about investment of Government, I say if you look at the affordable food supply and consistent, wholesome food supply we have in this country, I think that research has paid tremendous dividends for the investment you have made.

Mr. COMBEST. Well, I agree, Mr. Nix, with the comments that were made about how much we have prospered. Mr. LaHood was talking about this country and what has happened just in health from penicillin.

Unfortunately, when we go to the floor with a budget on research, people do not stand up there and talk about doubling it because we came across penicillin, and I totally concur that there have been huge benefits. Unfortunately, people do not always equate those to those research dollars, and so we continue to have to fight for every dollar we can.

And that is why I think it is incumbent upon us as a subcommittee and eventually a full committee to look at every way we can to utilize that, and in that light, I have a question to all of you. There may not be an answer that you want to share with us or there may not be a problem.

But I would ask you if there are any barriers that you have had to hurdle in order to get to where you are today. What can we do, just through the red tape or the problems that have been created, to make it easier for you, both from the standpoint of USDA's work with the private sector and with universities, and from the private sector's work that you do?

What can we do to make it easier for you?

Just go this way, and maybe everything is perfect, but I doubt it.

Mr. ARMSTRONG. I would like to answer that, Mr. Chairman, from the perspective of the companies that we invest in because I hear this a lot from the companies.

Typically the products that we help get into the marketplace are a little pricier than their substitutes. In other words, what we are putting out there is something based on plant matter or animal byproduct, and it costs a little bit more than the product that is based on petroleum, and this is really not with respect to this committee or subcommittee necessarily, but just Government-wide red tape per se.

In many cases though there are regulations out there, particularly in the environmental area, which if they were enforced, then this product, this environmentally friendly product made from animal byproduct or plant matter, whatever, would then in a lifecycle analysis be much more competitive than that petroleum-based product.

And I get a lot of that from our client firms. The EPA regulations, and I just pick EPA because that is, you know, the one we think of mostly, but there are other regulations, simply are not being enforced, and therefore, it is a little bit of an unfair competitive advantage that these petroleum products gain, and it is very difficult for the companies to crack into the marketplace when they are coming out with a 10 or 15 percent green premium, but again, if regulations were enforced and lifecycle analysis were taken into account, this carbohydrate-based product is actually a lot less expensive than the hydrocarbon-based product.

Mr. ROBINSON. Thank you, Mr. Chairman.

In the testimony yesterday, I actually stated that the Department felt that we had most of the legislative and administrative authorities that were needed to conduct the research and education program. However, the Congress has created for us two new things.

One is the National Agriculture Research, Education, Extension, and Economics Advisory Board, and the second is GPRA. Despite the negative comments about GPRA, by virtue of that, Congress has asked us to be accountable for what we are doing and to work more closely with stakeholders in setting priorities and to try to address our research program to the highest priority needs that are identified between stakeholders and the Department and scientists.

And I guess one of the largest things then that I would suggest that might prohibit us from full use of those two avenues that have been created for the Department and for the system of research and education is to have more flexibility, more flexibility for resource allocation to the highest and best use and to the most critical of issues that are being identified through that process, and to respond, in turn, when we go through the full cycle of GPRA to the evaluations that are coming out on the benefit of the products to the overall country.

Thank you.

Mr. JOHNSEN. Mr. Chairman, I heard a very important thing for me today, and that is my customer, Mr. Nix on the end, told me that he needs less hype and more immediacy in our responding to his needs, and we have been trying to do that, particularly so in recent years of identifying with each research project that we have who are the next users, we call them, because they may be research people. They may be what we call an implementer. That would be a company that would actually convert the technology into a commercial product that gets to an ultimate customer who actually purchases the product.

But this issue of immediacy and then the time line to develop the fundamental knowledge is one that is an age old problem of everyone needs it yesterday, and we recognize that, but being able to work with a set of priorities for a period of time where we can develop the knowledge needed to meet those needs and stay with them until we have actually met the challenge is reasonably important to the research endeavor.

If those priority needs change seasonally almost, it is not very efficient. We recognize that there are, in fact, national events. There are climatological events. There are international events which take place which requires an adjustment in the programs.

But if we can get clear signals from our customers about what a long-term need is, then we can meet them in an efficient manner. If we have to chase this year the priority is one direction, next year it is another, and we have to redirect those scientists, that is a difficult situation for us.

So a clear statement of priority need and the ability to stay with it for a while is important to the research endeavor.

Mr. BREWEN. Mr. Chairman, I will simply repeat what I said earlier in response to Congressman LaHood's question. I feel a little awkward here because BRDC, not I individually, but BRDC was, in effect, fairly responsible for the Technology Transfer Act of 1986, and that gave us the freedom to operate as an R&D consortium.

So we sort of have everything that we wanted. We have the ability to work very intimately with the public sector, the ARS, USDA, but to repeat what I said earlier and maybe clarify myself, as Dr. Johnsen indicated, he used the phrase "Death Valley," and BRDC's purpose is to bridge that valley.

We see the promising technology in the ARS. We have a corporate partner out here. Frequently we see technology that is very promising that does not necessarily stimulate our corporate partners because remember who our corporate partners are. They are Dow Chemical Company, Mallickrodt, American Home Products.

I am not talking about small entrepreneurial companies. I am talking about major corporations in this country, $30, $40, $50 billion a year in sales. They are not interested in technology opportunities that are going to create a $5 million or a $10 million a year market, but I am. BRDC conceptually is.

That is our purpose. Now, we need to be able to work more closely with ARS and anyone that works with Government agencies, even the entrepreneurial spirit that is working with the NIH or DOE. Where there are small financial rewards to be made, there should be an opportunity for those Government agencies to enter into the types of arrangements that basically provide a business opportunity.

ARC is the model, and I think it could be expanded upon, and I know that Peter and I have discussed this at great length in our offices back in Peoria. We see opportunities there, but we are hobbled because of the inability of ARS to get involved in that type of function.

Thank you.

Mr. WOLLENHAUPT. Mr. Chairman, the company I work for, Ag-Chem, is a small company, but even at that, we invest approximately $250,000 a year in public kinds of research to the ARS or land grant researchers.

I also serve on the Food Fertilizer Foundation Research Committee which also allocates monies to do public research. In recent years it is becoming increasingly difficult to find researchers that will conduct this type of research, and not only that; as a result of that, we are seeing fewer and fewer graduates come out of our institutions to step in and fill the roles that need to be met in private industry now and in the near future.

With respect to a hurdle, I do not know that it is a hurdle, but if we could have a signal sent to our agricultural research institutions that it is OK to do food and fiber production research, that could in the long run help us in the private industry side with respect to having people and also accomplishing the education and the basic production research that badly needs to be updated.

Mr. MARTINELL. Mr. Chairman, that is an excellent question, and I think causes us to get right down to the brass tacks of the issues here.

From my perspective, I think there is a fairly formidable barrier associated with assuring that we bring all the capability that the Nation has to the areas where priority research should be focused, and to the extent that there may be opportunities in the reauthorization to suggest and incentivize collaboration across agencies and between the public and private sector partnership, I believe that would be in the best interest of accelerating the results of research to the point where it can be commercialized.

An example might be to provide an opportunity to overcome the barriers, which are a natural part of our appropriations authorization process, regarding missions associated with the agencies such that if collaboration occurs, there is an opportunity for sharing in your idea associated with the venture capital model across those agencies.

That would be an incentive that would encourage bringing the right people together on the right teams fast, which gets things to the marketplace faster.

Mr. NIX. I just certainly do not feel that from our perspective that wholesale change is needed in what is being done from a research perspective, and I am certainly not a researcher, but from the end source idea, again, the capitalist in me says that somehow in applied research there ought to be investment dollars at the end of that pipeline, down where that final user is, so that the individual researcher up there that is doing basic research can find the highest and best use.

But I think that AG-CARES acts as a source of funding at the end of that pipeline to help pull that research in there, and my 6 rating while ago was no indictment of this research, but I just think some fine tuning in getting it adapted on a more rapid basis is something that is well worth discussion.

Mr. COMBEST. Well, as I had said earlier, we would certainly leave open and offer the opportunity if any of you wanted to make further comments, but I guess I would solicit maybe some comments. If you all, those of you who wish, could be as specific as possible and maybe tell us exactly where the problem lies and how your recommendations might be because we do have an opportunity in this authorization to hopefully be able to fix some things that need fixing.

Obviously we do not want to make it worse. So if you would feel comfortable in following any of that up with written suggestions about how we might specifically deal with some of those problems, I think it would be appreciated.

Mr. Dooley.

Mr. DOOLEY. Yes. I would just like to get an understanding on how the Department, utilizing the various components of the research opportunities, responds to the real problem of methyl bromide? I mean, when it was triggered with the phase-out by the Montreal protocol, I mean, obviously the potential problem and the magnitude of it from the financial impact becomes apparent.

Does the Department then do an evaluation in their consideration of their NRA proposals on a competitive, as well as their

ARS, functions? Did you immediately elevate this in terms of priorities, finding an alternative? What efforts were undertaken by some of the other agencies that were present in terms of soliciting that private-public partnership in order to try to find an alternative?

And what is the magnitude of the financial investment that USDA is making at this time to solve the problem?

Mr. ROBINSON. I can respond to part of your question immediately, and I will certainly get back to you on the investment because that would require looking across those budgets. We certainly will do that, Mr. Dooley.

There are about three or four things that enter into the decision process that you just outlined. For example, in the NRI, despite the fact that it is looked upon as a scientist controlled agenda simply for scientists, one of the criteria that panels use in assessing the viability and the competitive nature of projects is the relevancy of those projects to current issues, and those current issues are part of the discussion process that goes on.

The second area in terms of both formula funding and often targeted funding that go to universities through the Cooperative State Research Service; then the research committees, both at the university level, the regional level, and through the various committees that deal with the research community, begin to look at the highest priority issues and begin to encourage the science community address those issues.

Let me give you a very specific one. The interaction between the regional experiment station directors and the CARET organization is an interface between users and the research community. That is one example. Many others are with the producer groups, both in States and regional and national levels, that help address the research better.

The Agricultural Research Service goes through its agenda using the same kind of planning and review process to address the flexibility to those highest priority research areas. Yet one of the responses that I had to the Chairman's question had to do with flexibility, and often within both of those budgets the constraints for use of funds in specific categories over time—actually they are cumulative over time—have reduced somewhat the flexibility of the Department to address those very high priority issues.

But I will get back with you in terms of the specific magnitude of funds addressed in methyl bromide.

Mr. DOOLEY. When we have a problem, again, with methyl bromide, what is the coordination between EPA and some of their priorities, some of their research, and USDA?

I mean it really gets back to some of the points, I think, that were made by others. I think maybe Mr. Martinell made the point that we almost need a more programmatic response to some of these problems that go over interagency, multi-discipline, and how is that incorporated, again, with the methyl bromide example?

I mean, how does USDA interact with EPA in order to try to resolve this problem?

Mr. ROBINSON. It is a good question, and let me answer it both ways. Within the Department itself, a new policy advisory group has been established for the research, education, and economics area, mission, which is composed of the leadership from all of the other mission areas.

One of the purposes of that is to continue to monitor and think through the research program with respect to the high priority problems or issues or, in fact, sometimes disasters that are arising because of pests, because of natural disasters, and so forth.

Additionally, the Department of Agriculture reacts and acts with on a regular basis the Environmental Protection Agency and the Food and Drug Administration with regard to various aspects of research that are needed, including a more recent memorandum of understanding that has been developed between the Department of Agriculture and the Environmental Protection Agency, particularly with regard to a series of issues surrounding pesticides.

Mr. Johnsen. If I might add something sort of from the field perspective about how it trickles down into an actual research location, one of the strengths of ARS is that, in fact, it has a sort of resident population of agricultural scientists working in a wide variety of areas, and for example, in Peoria, we have a group working in what we call bioactive agents, and these are people interested in understanding the chemical ecological impacts of compounds that are produced by plants.

And as the methyl bromide problem became more visible, even before the action started, our national program staff began to have consultations with scientists in diverse areas of research asking what perspective they had to lend to finding a solution for the problem.

And, in fact, we have a fair effort in my laboratory looking at methyl bromide alternatives. Yet they will not be included in any numbers that you get from Dr. Robinson because they are still working on other areas, but they have their eye on that methyl bromide ball, in addition to their assigned responsibility, because they are able to bring a variety of techniques and technologies to addressing the problem.

But that sort of overall communication from national program staff right down to the bench level scientist, I think, is important to having this sort of grounds-up generation of solutions and technical approaches to a problem, which is the strength of the larger system.

Mr. Combest. Mr. Lewis.

Mr. Lewis. Yes. Thank you, Mr. Chairman.

Dr. Robinson, I want to just ask you a question on a critique by the USDA on H.R. 725. They said that the NRI does not have authority to provide education, information dissemination, but in the law itself, in current law, it provides for the transfer of such research to on farm or in market practice. It does provide for that, or am I misunderstanding that part of the legislation?

Mr. Robinson. Actually there are two components to that, and I think you have got a very valid point, Congressman Lewis.

The NRI was originally established or it was projected to be established at a $500 million level. That level had a lot more flexibility and components in it than I think the system that has been operating in the course of the NRI's life.

The NRI has never been funded for more than about $112 million, as best I can recall, and I can get the very specific information for you. As a result of that, the NRI has concentrated on mission oriented or mission oriented fundamental research and relied on a partnership with the extension community in terms of leveraging that research into an educational program that could be utilized on farms and with producers.

Actually the reorganization that occurred in the Department of Agriculture a few years ago, which I think is 3 or 4 years ago now, which combined the old Extension Service and the Cooperative State Research Service, was another move in that direction to try to look in sort of a tandem way, given this far more modest funding of things like the NRI and with the Extension Service, to try to combine objectives and move ahead.

But the Department's view is that H.R. 725 has the potential of making a major shift at least in emphasis towards educational programs, and it does have a problem with that.

Mr. LEWIS. I would just like to follow up on that and say really H.R. 725 does not affect that from the standpoint that it does not change the current law.

One more question. You had mentioned, Dr. Robinson, earlier that you had had some research done on tobacco, and as we all know, Federal law prohibits the use of Federal dollars in tobacco research.

Of course, I do not support that particular law. I think we should, but I would just like to ask you: were Federal dollars used in that research? And if so, how were you getting around Federal law on that?

Mr. ROBINSON. The one that I reported on, Congressman Lewis, had to do with a result or an accomplishment historically out of BARD. One, I cannot give you the date of that, but I could certainly go back and look it up, and whether it was pre or post the decision to eliminate any research directly to tobacco.

But more particularly, that project was actually devoted to the discovery of an antiviral substance actually in the tobacco plant, which was used, in turn, with tomato plants as an effort to control diseases, and my colleague just says that the law indicates that tobacco research is permissible if it is using tobacco for a model or using substances to address other problems in the arena.

Mr. LEWIS. OK. Thank you.

Mr. ROBINSON. Certainly.

Mr. COMBEST. Gentlemen, we appreciate very much your taking the time to come today, and as indicated earlier, we would welcome any additional comments on this portion of these hearings or other that you become aware of. We do want to make certain we do not leave any stone unturned.

Mr. COMBEST. The hearing is adjourned.

[Whereupon, at 12:17 p.m., the subcommittee was adjourned, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

ANSWERS TO QUESTIONS FROM CONGRESSMAN GEORGE BROWN FROM NYLE WOLLENHAUPT, STAFF SOIL SCIENTIST, AG-CHEM EQUIPMENT CO.

Question No. 1

Please provide specific examples of the environmental benefit of precision agriculture technologies. Are amounts of fertilizer, pesticides, or herbicides reduced through the use of these tools? If so, by what percentages?

Response

When one rate of fertilizer is applied across a field, portions of the field are usually under- or over-fertilized. Site-specific application has generally neither increased or decreased fertilizer application. Fertilizer is reallocated from areas of the field that need low amounts of additional nutrients, to those areas requiring high amounts of nutrients for optimum crop production. Fertilizer is therefore applied at rates appropriate for specific site conditions.

The site-specific application of pesticides and herbicides to pests that only occur in specific locations of a field will logically lead to lower pesticide applications. The amount of reduction will be dependent on crop, field and pest type. If a pest only occurs in 20 percent of the field, the reduction in pesticide use could potentially be 80 percent for the specific pest.

Question No. 2

You provide several examples where variable fertilizer application rates increased net returns over conventional management practices. What proportion of the increase in net returns is due to cost savings derived from decreases in the amounts of fertilizer inputs used, and what proportion is due to increased yields? The values you provided are net increases in return per acre. What percent increase in returns per acre do these values represent for the crops you mentioned (winter wheat, sugarbeets).

Response

In the examples I provided, the net returns are due to increased yield and/or quality, with essentially no change in fertilizer rates. The net returns are profit to farmers. I do not know the percent increase per acre. The number would be very farmer/crop specific. The return for each additional dollar invested to accomplish site-specific management ranges from 10 to 200 percent.

Question No. 3

On pages 6 and 7 of your written testimony you provide impressive data on the current utilization of these technologies and on the rate of adoption. Taxpayers have already invested a great deal of resources in the research and development of GPS technology already through the Department of Defense. If this technology is already achieving the rate of adoption you report, why are dedicated research funds needed to support it through a program such as the National Research Initiative, which is more, directed to basic research? Why shouldn't we use CRADAS to support further research in this program area?

Response

If you remove yield monitoring as a new technology, fewer than 5 percent of farmers have adopted "precision technologies". GPS technology only deals with locating oneself on the earth's surface. The investment in the Department of Defense has not contributed to food and fiber production.

Understanding and responding to the biological, physical and chemical conditions that influence crop production and environmental stewardship, has been and needs to continue to be the focus of agricultural research. This research helps maintain low cost, high quality food and fiber for consumption while maintaining or enhancing the quality of our natural resources. The benefits are to society as a whole, and are generally not commercializable. The development of a specialized sensor for determining nitrogen needs in a specific crop is an example of something that could be advanced with CRADAS. The response of a crop to varying soil nutrient levels and response to additions of nutrients, however, needs to evolve from "unbiased" University research, at which point the fertilizer industry can participate in carrying this knowledge to individual farmers.

If researchers are only encouraged to conduct research on projects that are supported with private sector money, the basic and applied non-commercializable research will not be conducted. This shift is already being felt in production agriculture with the shift in agricultural research from basic applied soil chemistry, soil fertility and soil biology research, to biotechnology.

Question No. 4

The Federal Government investment in technologies of use to precision agricultural systems has been considerable, from GIS and GPS systems to agronomic models being used in the field. Given that the development of precision agriculture systems are already in commercial use, and given that future developments will have a ready commercial market, shouldn't there be a commercial match required for this research, as there is in other technology development programs in the Federal Government.

Response

Private industry has spent and continues to spend considerable money to work around "selective availability", so that the military GPS system can be used in agriculture. Even other Federal agencies are spending taxpayer dollars to find "work arounds" to the taxpayer/military GPS system. I personally am not sure the Federal Government GPS system is an asset, or taxpayer liability.

I am not aware of any Federal Government GIS systems research that is available for agriculture.

The agronomic models such as the cotton growth model, developed by Federal Government supported agricultural research, have grown out of many years of research and serve to guide future research. While excellent research tools, few have shown widespread applicability at the farm field level.

Until Federal agencies like the Department of Defense and Department of Energy catalog and make available information on the technologies they have developed or are developing, it will be difficult to determine what new technologies may be suitable for commercial development and what will need to be supported primarily by taxpayer investment.

The company I work for uses a military technology to sense when approaching orchard trees, to turn on and off a sprayer and to adjust the spray pattern. This technology was made available to the private sector through a small business grants program, I believe administered by the Department of Defense. Perhaps in addition to CRADAS, this is another model for transfer of government funded technologies to the private sector, with private sector investment.

I concur that private sector investment is important in moving new technologies to production agriculture. Other panel members cited some excellent examples. However, basic and applied research on food and fiber production through a better understanding of how crop, soil and climatic factors affect crop production, must come primarily from federally funded research. This latter research is critical to low cost, high quality food production, but does not lend itself to commercialization. This research is also the foundation of knowledge needed by college students in preparation for jobs in agriculture, now and in the future.

Question No. 5

What do you consider the magnitude of the research needs to be in this area, over the next five years? What portion of that legitimately can be assigned to the Federal Government?

Response

The following is a personal best estimate, without input from of The Fertilizer Institute. The basis for many of our crop production recommendations comes from research conducted in the 1950s to the 1970's. The adoption of new and emerging technologies has leaped ahead of our basic soil and crop production science knowledge. Eighty percent of the Federal research budget needs to be allocated to basic/applied research on food and fiber production. Ten to twenty percent on new and emerging technologies, with expectations of commercial matches on new technologies that have or may have commercialization potential.

FROM USDA

Question: Would it be possible to have achieved this level of cooperation between US and Israeli scientists in the absence of the dedicated funding that BARD has supplied to these efforts?

Response: The availability of funds dedicated to the BARD program has played a critical role in our efforts to achieve cooperation and communication between US and Israeli scientists. Research on agricultural production under types of environmental conditions that are shared between the two countries is of particular priority for the program. It should be noted that the fundamental sciences funded under BARD are in problems areas also supported by the National Research Initiative Competititve Grants Program. However, the NRICGP address problems of United State Agriculture and not agriculture inother parts of the world.

Question: What is the proportional contribution of the U.S. and Israeli governments to BARD?

Response: The U.S. and Israeli governments contribute equally to BARD.

Question: Describe the peer review process used by BARD to evaluate and award grants? Does the peer review panel contain both US and Israeli scientists?

Response: Each proposal is initially reviewed by two panels of scientists, one in the US and one in Israel. Each of these panels has a panel manager who is responsible for assigning reviewers. There are eleven sets of panels in the U.S. and an equal number in Israel, corresponding to eleven discipline areas. The discipline categories are (1) Agricultural Engineering, (2) Animal Production, (3) Animal Protection, (4) Aquaculture, (5) Fruit Tree Crops, (6) Field & Garden Crops, (7) Post Harvest, (8) Soil & Water, (9) Agricultural Economics, (10) Cellular & Molecular Biology, and (11) Plant Protection. Each panel ranks their proposals in priority order for the discipline and summarizes their comments and recommendations in an evaluation form.

These evaluation forms are made available at the next level of review of proposals, which is done by BARD's Technical Advisory Committee (TAC). The TAC is composed of U.S. and Israeli scientists. The purpose of the TAC is to recommend whether or not research proposals in the various scientific disciplines should be funded. Those proposals that they recommend for funding are also ranked by the TAC with regard to funding priority. The final decisions regarding support or non support of proposals is made by BARD's Board of Directors. BARD's Board of Directors contains three Israeli members and three members from the United States.

TESTIMONY OF DR. ROBERT E. ARMSTRONG, ACTING EXECUTIVE DIRECTOR, ALTERNATIVE AGRICULTURAL RESEARCH AND COMMERCIALIZATION CORPORATION

Thank you, Mr. Chairman, for the opportunity to appear today before this distinguished Committee. I appreciate the deep interest that this Committee has taken in the Alternative Agricultural Research and Commercialization (AARC) Corporation.

Congress created AARC in the 1990 farm bill as an independent corporation. Its mission is to expedite the development and commercialization of bio-based industrial products made from agricultural and forest materials and animal by-products. This mission was reaffirmed by Congress in the 1996 farm bill.

The creation of the AARC Corporation followed a 1987 report by the New Farm and Forest Products Task Force which recommended adoption of the following national goal: To develop and commercialize, within 25 years, an array of new farm and forest products, utilizing at least 150 million acres of productive capacity, to meet market needs representing net new demand for agricultural and forestry production. The Task Force identified development of new crops and new uses for existing crops as the only way to revitalize ailing segments of American agriculture and realize its full economic potential for our nation.

Last year, Congress began the 7-year phaseout of commodity price supports. This added to the urgency to develop and commercialize new crops and new uses for existing ones. The United States must create and sell bio-based, value-added products if we are to maintain our global market share for agricultural products. The AARC Corporation and the companies in which it invests are leading this process.

The AARC Corporation is a venture capital firm, the only one that is wholly-owned by the Federal Government. It invests in private companies that commercialize emerging technologies created through public and private research. The AARC Corporation provides start-up or early-stage capital to firms. We negotiate repayment arrangements with the companies in our investment portfolio. The AARC Corporation negotiates an equity position in the companies, a royalty repayment, or a combination of the two. These repayments go into a revolving fund and are reinvested in additional companies.

The AARC Corporation's emphasis is on commercialization—that is, on translating new technologies into products that can compete profitably in the marketplace. In accordance with the Department of Agricultural Reorganization Act of 1994, the AARC corporation shifted on the USDA organizational chart from the research mission area to the rural development mission area. Agricultural research and rural development receive equal set-asides from the Fund for Rural America, evidence of the close link between these two mission areas within USDA.

Although the AARC Corporation did not make its first investment until 1993, some of its firms already have entered both the domestic and foreign marketplace. We are on-course with the projected sales and subsequent repayments that were established by the AARC Corporation's Board of Directors in its long-range business plan for the Corporation.

Congress has given the AARC Corporation a mandate to privatize by the year 2002. To fulfill this charge, the Corporation must invest in companies that will generate an income stream for AARC before 2002. Companies that meet this criterion generally are beyond the research stage. Our capital investments enable them to scale-up production and market their innovative, bio-based products. However, this does not mean AARC companies do not do research. Indeed, most are heavily involved in ongoing research and development; activities that AARC, as a shareholder, strongly supports.

Within the USDA, the AARC Corporation works with a number of sister organizations to further the development and commercialization of bio-based products. For example, scientists from the Agricultural Research Service (ARS) advise us on the technical merits of investment opportunities. ARS shares with us information about new technologies with commercial potential and it has integrated the AARC corporation into its technology transfer program.

Additionally, the AARC Corporation works closely with the Cooperative Research Education and Extension Service, whose scientists assist us with the technical review portion of our due diligence. They also inform us of promising new crops or technologies.

Another example of inter-agency cooperation is the commercialization of technology developed by the Forest Products Research Laboratory (FPRL). Gridcore Systems International, a California firm, uses FPRL technology to make lightweight furniture, office dividers, and stage sets from the fibers of kenaf and other plants. The AARC Corporation funded the initial development of the company. They have subsequently secured nearly $20 million in additional funding from private sector sources.

USDA's Small Business Innovative Research (SBIR) agency makes grants to companies to bring them to the cusp of commercialization. SBIR often improves the operation and technology of companies so they are prime candidates for next-stage financing from the AARC Corporation.

Last year, Secretary Glickman established an inter-agency council to coordinate research, development, and commercialization of products from agricultural materials. This Bio-based Products Coordinating Committee focuses on functional integration within USDA on issues and policies pertaining to bio-based, value-added products made from agricultural ingredients. Committee members include the AARC Corporation, SBIR, Agricultural Research Service, Economic Research Service, Forest Service, Rural Business and Cooperative Development Service, the Agricultural Marketing Service, Foreign Agricultural Service, and the Natural Resource and Conservation Service.

Additionally, the incumbent Under Secretary for Research, Education, and Economics, by legislation, is a member of the AARC Corporation Board of Directors. This ensures open communication and full cooperation between AARC and the various USDA research agencies at both the staff and board levels.

The AARC Corporation would strongly support increased efforts within the USDA to help expedite the process of moving innovative products from the research bench to the marketplace.

As a participant in the ongoing research, development, and commercialization efforts of USDA, we have identified some unmet research needs. Foremost of these is Agricultural Research Service assistance with the development of new fiber crops. For example, one of the most promising AARC companies, Natural Fibers Corporation of Ogallala, Nebraska, mixes syriaca, or milkweed, fiber with goose down to make hypoallergenic pillows and comforters. We believe syriaca has great potential as a commercial crop. But it urgently needs agronomic assistance from ARS to become viable.

One of the most promising new fiber crops is kenaf. USDA has supported development of a budding kenaf industry in the U.S. AARC companies use kenaf fiber to make paper, erosion-prevention mats, and a lightweight building material that replaces wood. KEN-GRO Corporation of Greenwood, Mississippi, uses kenaf to produce a soil-free potting mix. This product replaces peat, of which there is a finite supply.

The State of Mississippi currently has the most kenaf acreage. Our contacts there tell us the Japanese are ready to buy a million metric tons per year of kenaf fiber. Demand for kenaf clearly is on the rise. But there are fewer than 2,000 acres of kenaf in Mississippi, with smaller crops in Texas, California, Florida, and Delaware. This nascent crops has enormous commercial potential for the U.S., but more agronomic research must be done to expand kenaf's range and production.

In Texas, farmers and ranchers earn an extra $15,000 - $20,000 on average by selling wheat straw to Agriboard Industries which compresses it into load-bearing walls. Without such new uses, wheat straw would be a very low value crop.

Purdue University views the development of new crops as vital to the future of American agriculture. It has established the Indiana Center for New Crops and Plant Products. The Center has a massive data base that enables researchers worldwide to access the most current information about new crops. This is an endeavor that clearly needs continuing support.

Another significant category of new crop development is oil seeds. Several AARC companies product lubricants and cleaning products from vegetable and seed-based oils. They are environmentally friendly, commercially viable, superior performance replacements for products made from non-renewable resources such as imported petroleum. These new products are made from canola, crambe, rapeseed, and other plants. Several others are under investigation. For example the AARC Corporation is working with a farmer group in Oregon to develop Meadowfoam as a new oil seed crop. We have earmarked $1 million for investment in this project. Again, much of the Meadowfoam research has been done by ARS. Additional research funds are necessary if we are to continue to improve the agronomics of commercial production of meadowfoam.

Castor oil is another example. Castor was grown in the U.S. until after World War II. Today, all castor oil is imported into the U.S., about 42,000 metric tons a year. The price varies widely because of variable weather patterns in India, Brazil, and China, the main sources. Tung oil is another crop formerly grown domestically, but now imported. We believe it is ready for revival in the U.S. and test plots are being grown in Mississippi and Florida. Again, additional agronomic research could speed the process of developing or revitalizing these industries in the United States.

In the decade since the New Farm and Forest Products Task Force report was issued, we have validated its recommendation for development and commercialization of new, bio-based, value-added products. We have established new companies and even industries around new uses and new crops. The potential that the Task Force and Congress foresaw clearly has been proven. Equally clear is the need for additional research in this field if we as a nation are to achieve our potential.

Now may be a propitious time to reconvene the New Farm and Forest Products Task Force. It could examine the collaborative efforts within government and between the public and private sectors to research, develop, and commercialize new crops and new uses. And it could recommend ways to accelerate development of the bio-based economy.

Mr.Chairman, I will be pleased to answer any questions that you and your colleagues have on this topic.

STATEMENT OF DR. PETER B. JOHNSEN, AGRICULTURAL RESEARCH SERVICE

Mr. Chairman, thank you for your kind invitation to address this committee on agricultural research issues. My name is Dr. Peter B. Johnsen. I am Director of the National Center for Agricultural Utilization Research of the USDA's Agricultural Research Service in Peoria, Illinois.

Today, I would like to describe the importance of the current technology transfer legislation and the impact it has had on the program of the National Center for Agricultural Utilization Research. I will describe how we have developed our long-term, fundamental research discoveries into commercial successes using the authorities provided by the legislation. I would also like to describe some challenges to technology transfer as we have moved science to the market place in order to enhance the agricultural economy and improve the nation's global competitiveness.

As the in-house research arm of the USDA, the Agricultural Research Service (ARS) develops new knowledge to solve agricultural problems of broad scope and high national priority. The activities of the Agency serve to meet the nutritional needs of the American consumer, sustain a viable food and agricultural economy, and maintain a quality environment and natural resource base. The research of the National Center for Agricultural Utilization Research addresses all of these mission areas.

USDA UTILIZATION LABORATORIES. The USDA Utilization Centers have been successful in implementing their mission. Starting with a four million dollar appropriation in 1938, the Secretary of Agriculture was instricted to establish, equip and maintain four regional research laboratories, one in each major farm producing area "to develop new scientific, chemical, and technical uses and new and extended markets and outlets for farm commodities." The laboratories were constructed in Philadelphia, Pennsylvania; New Orleans, Louisiana; Albany, California; and Peoria, Illinois.

Scientists from these laboratories responded to the mandate by developing the soybean from animal forage to a crop worth approximately 14 billion dollars at the farm-gate. With a host of new uses for its oil and protein, soybeans have found their way into thousands of household and industrial products based on their work. The Laboratories greatly helped the U.S. cotton industry be more competitive with synthetics with the invention of the permanent press treatment, created a standard feature of the American breakfast with frozen concentrated orange juice, and produced foods that sound so ordinary, such as the instant potato flake, that we forget that they were invented within our lifetime. The entire frozen food industry is based on the TTT (time-temperature-tolerance) work of the labs. Millions of lives have been saved due to the technology for the mass production of penicillin and several blood replacers and extenders. These laboratories have contributed a number of innovations that are helpful in everyday life.

TECHNOLOGY TRANSFER LEGISLATION. Congress and the Department have recognized the value of public private partnerships long before Technology Transfer was a common concept in government. The original charter for the utilization laboratories specifically included the authority to work directly with industry and the location of the laboratories in industrial communities rather than on college campuses reflected this Congressional intent. The four labs have been extremely successful in transferring new knowledge to the private sector for commercialization.

In many cases, however, this new knowledge results in intellectual property protected by a patent which, in turn, controls how the new knowledge can be implemented and commercialized. Until 1980, all federally owned inventions were available for licensing only on a non-exclusive basis. Many ARS inventions developed to address specific commercial problems and market needs were never adopted by industry. The inability of the U.S. government to grant an exclusive license to its patented inventions prevented industries from making the significant financial investments needed to commercialize the technologies. Without the necessary legal protection, industries passed-up promising technology. In 1980, two important technology transfer laws were passed by Congress which influenced both Federal and academic research programs.

First, Congress added technology transfer to the mission of Federal Laboratories in the Stevenson-Wydler Technology Innovation Act (Public Law 96–480). A second law, the Bayh-Dole Act (Public Law 96–517), provided that small businesses and non-profit contractors (and grantees) could own title to inventions developed with Federal funds and gave Federal laboratories authority to grant exclusive patent licenses on its patents to private industry.Following the 1980 Act, ARS was quick to take advantage of the new authority to grant exclusive patent licenses and technology transfer activity increased. This new authority has greatly expanded the agency's ability to contribute meaningful solutions to industry needs. Since the law was passed in 1980, ARS has received more than 850 patents. More than 300 licenses have been granted on ARS patented technology with approximately 200 active licenses in effect now. Of these, approximately 40 percent are licensed to small business. In calendar year 1996, ARS granted 28 licenses to the private sector.

In theory, exclusive patent licenses could ensure that market-ready technologies could be commercialized with the direct assistance of ARS scientists. However, the gap between basic agricultural research findings and its application could be reduced by increased private sector involvement in developmental research. The lack of legal mechanisms for industrial research and development scientists to work closely with ARS scientists in the joint development of commercial technology was an impediment to commercialization of ARS scientific inventions. Exchange of confidential and proprietary information necessary for collaborative research efforts was not possible under existing U.S. law.

Congress addressed this gap in 1986 with passage of the Federal Technology Transfer Act (FTTA) of 1986 (Public Law 99–502) which provided the authority for cooperation between the Agency and the private sector. This act establishes the legal mechanisms for cooperative research and development agreements (CRADA's) allowing direct collaboration between Federal laboratories and private companies to commercialize technology based on the scientists' research. The law specifically allows such cooperative research to cover the full range of research "from fundamental to applied to developmental" and even through commercialization. In 1987, ARS became the first Agency in the Federal Government to sign a CRADA with a private firm under FTTA authority. ARS developed a new method to immunize poultry by injecting vaccines into the egg. This technology was exclusively licensed to Embrex, Inc., a start-up company with two employees in Research Triangle Park, North Carolina. The ARS technology allowed Embrex to develop and patent the INOVOJECT system. The INOVOJECT can inoculate 20 to 50 thousand hatchery eggs per hour. Today this method protects 65 percent of the U.S. poultry flocks and 70 percent of Canadian. Embrex now employs more than 120 people, and recently opened an international operation in London where it has entered the European and African markets. The company is also working on similar arrangements with the Japanese to enter the Asian market.The ARS continues to be one of the most successful agencies in the Federal Government in using CRADA agreements to link research programs with the private sector. In July 1995, ARS executed its 500th CRADA when the National Center for Agricultural Utilization Research and Mycotech Corporation agreed to develop environmentally friendly biological control agents to kill insect pests of cotton, nursery crops and melons. The ARS has developed more than 650 CRADAs with the private sector since 1987, demonstrating the popularity of this kind of partnership. Of those CRADAs, 34 percent are with small business. In calender year 1996, ARS signed 78 CRADAs with the private sector.

TECHNOLOGY TRANSFER AT NCAUR. The National Center for Agricultural Utilization Research (NCAUR) located in Peoria, Illinois, is the largest of four ARS utilization laboratories and operates with base funding of $23 million, 110 research scientists, 160 scientific support personnel, and 50 contract employees for operations and maintenance. Our mission at NCAUR is to develop and commercialize new uses of agricultural commodities for industrial and food products, to develop new technology to improve environmental quality, and to provide technical support to Federal regulatory and action agencies.

While all the Utilization Laboratories have outstanding records of accomplishment, I would like to focus on the activities of the National Center for Agricultural Utilization Research (NCAUR). Like all ARS research facilities, we conduct long-term, fundamental research to solve high priority, national problems and then involve private sector partners to convert these findings into practical and commercially viable solutions which benefit the public and the environment.

The National Center for Agricultural Utilization Research is one of the power houses for Federal technology transfer. In the past year Center scientists filed 17 patent applications on new inventions. Since 1980 the Center has received 108 patents for its inventions. Of these, 41% have been licensed for commercialization by the private sector demonstrating the ability of Center scientists to address real world problems. In fact, 25% of all technologies licensed by the USDA, Agricultural Research Service in the past year came from Peoria. But before an idea is patented and commercialized, new knowledge must flow from the science of discovery. It is from this fundamental work that practical ideas can be developed for commercial application. In a very direct way, fundamental problem solving research is the seedstock for commercial applications work. Without this significant investment in developing new knowledge, the ideas and technical basis for commercial opportunities would soon dry up. To generate these seeds of knowledge and technology, scientists in Peoria conduct fundamental and applied research and published 356 scientific articles in peer-reviewed journals in the past year. In addition, they wrote 66 book chapters and review articles, and another 415 short reports of research results. This achievement speaks highly of our scientists' productivity and the respect afforded them by the scientific community. Many of our scientists are National and International leaders in their field.

THE SCIENCE OF DISCOVERY AND COMMERCIAL APPLICATION. These efforts in understanding scientific fundamentals have allowed the Center's scientists to develop numerous successful products. A basic understanding of the physical and chemical properties of polymers found in plants and how to modify them for practical application has been the key to our success. By using this scientific information and exploiting the legal authorities of the technology transfer laws, NCAUR scientists have brought science to the marketplace. I would like to provide some recent examples of this approach to illustrate our experiences.

All plants contain significant amounts of cellulose and hemicellulose. Fundamental research into the chemical composition of these materials and how they might be modified has led to a number of successful commercial products. The first is Fluffy Cellulose. Initially envisioned as a way of producing inexpensive animal feed, the technology of refining the plant material led to a process which yields a superior dietary fiber and bakery ingredient. This technology was patented and, using the authority of the 1980 Bayh-Dole Act, a simple exclusive license was issued to Canadian Harvest of Cambridge, Minnesota. With an annual market exceeding 20 million pounds now, Fluffy Cellulose is used in specialized foodstuffs as a flour substitute imparting high dietary fiber and low calories. The guarantee of exclusive rights to this invention prompted the licensee to invest in the production facility and market development work needed to launch this product just as the Congress had envisioned with its 1980 legislation.

A second commercial success building on NCAUR's fundamental work on enzyme modification of plant polymers is Oatrim. This NCAUR invention continues to grow as an ingredient in low-fat, specialty food products. First announced in 1990, the product was named one of the 100 most significant new technologies of 1993 by Research and Development Magazine. Oatrim joins other well known products which have gone on to become part of our everyday life including the video recorder, antilock brakes, the automated bank teller and halogen lamps.

Oatrim is now being made and marketed under exclusive licenses by two partnerships in the food industry. One partnership is between Quaker Oats and Rhone-Poulenc. The other is a joint venture between the ConAgra and A.E. Staley called Mountain Lake Speciality Ingredients Co. The ability to negotiate exclusive terms in complex licensing agreements serves the public interest by having the technology come to the market place in the broadest possible way. Mountain Lake is selling Oatrim under the trade name of TrimChoice and is found in ConAgra's Healthy Choice line of products including, hot dogs, bologna, cheese and 96% fat-free ground beef. Smaller companies are using the fat-replacer in baked products, such as muffins and cookies, and in chocolate candy. While functioning as a fat replacer, Oatrim has the potential to have a significant positive impact on public health; it is our goal to see the widest possible distribution of the technology. Numerous nutritional studies demonstrate the health benefits from Oatrim. Because it contains beta glucan which lowers cholesterol, consumers show responses to the lowered calories as well as decreasing "bad" LDL without increasing HDL cholesterol when consuming products made from Oatrim.

The production of a plant in Minnesota built to produce Oatrim exceeds 20 million pounds. Oatrim sells wholesale for about $2.00 per pound, but most of this product is used in high-value specialty foods, making the economic impact on American agribusiness far greater than $40 million. A wide variety of retail food products have now reached the marketplace as the product finds further application.Building on this same work, a third commercial development has been announced in the past year and was widely reported in the national media, such as CNN and USA-Today. Z-Trim is a natural dietary fiber food ingredient made from the hulls of oats, soybeans, peas and rice or bran from corn or wheat. So named because it has zero calories, Z-Trim is a different type of fat substitute made as a purified, insoluble fiber. When mixed with water, it makes a smooth gel and can be substituted for conventional cooking fats. A person who normally eats 3,500 calories a day could cut as many as 700 calories by eating the same kinds of food in the same volume, while ingesting about half an ounce of Z-Trim to replace fat.

A special feature of the development of Z-Trim is that it was developed under a CRADA with Mountain Lake Speciality Ingredients Co., a licensee for Oatrim. The industrial partner's commercial processing facilities were critical for the development and refinement of the process. By its participation early-on in the research and development process, they were permitted a "first-right-of-refusal" for exclusive patent rights to the technology under the 1986 Federal Technology Transfer Act and was rewarded for its risk-taking early on during the invention process.

Scientists at NCAUR have a history of developing novel new materials which lead to an explosion of new products. On of the best examples is Super Slurper. By attaching a synthetic polymer to starch, NCAUR scientists produced a material which is capable of absorbing hundreds of times its own weight in water. The invention has found commercial life over the years in products as varied as seed coatings, wound dressings, automobile fuel filters and plastic barriers used at construction sites. Extension of the invention by the private sector has led to the most successful application, the absorbent gel used in disposable diapers.

Recently our scientists have developed another totally novel material which promises to have as many applications as Super Slurper. A non-separable starch/oil composite that mixes with water to form a stable emulsion has been developed and patented by scientists at the National Center for Agricultural Utilization Research. USDA has coined the name Fantesk for this technology. Its fat-mimicking properties coupled with its inherent emulsifying and encapsulating properties make it ideal for many commercial applications. Foods such as ice cream, salad dressings and processed meats have been prepared successfully. Opta Food Ingredients of Bedford, Massachusetts, licensed the technology for a variety of food applications. Fantesk is licensed to Seedbiotics Inc. of Caldwell, Idaho, to manufacture seed coatings of fertilizers, herbicides and pesticides. Union Camp Corp. of Wayne, New Jersey, licensed the technology to manufacture environmentally-friendly adhesives, glues and coatings, and is working under a CRADA to develop other industrial uses for Fantesk.While the previous examples of invention and technology transfer have demonstrated our uses of patent license and CRADA legislation, I would like to briefly introduce another avenue we have used, which was made available by Congress. The Biotechnology Research and Development Corporation (BRDC) was created with seed money from Congress to be a link between government and private industry for the development of new public technologies. The Corporation's Board of Directors consists of representatives from member companies with an observer from the Agricultural Research Service.

This public-private partnership leverages research dollars with member companies playing an important role in the development and maturation of technologies for which they envision an immediate commercial potential and which solve agricultural problems and contribute to the farm economy, but which probably would not be done by industry laboratories. By the member companies providing commercial insight to research projects, technology transfer is enhanced and accelerated. Generally, these projects involve early-stage, enabling technologies for solutions to long-term problems. This kind of research is hard to justify to the member companies' stockholders, but nevertheless is needed for a vibrant agricultural economy. BRDC is now nine years old and is developing an independent income stream from returns on commercialized public inventions involving genetic engineering tools, bioplastics and biological control agents.Starch based plastics have been a goal of NCAUR's scientists for years. In fact, the first patent issued to our scientists was in 1976. However, practical application required much more knowledge which has been hard won over the years. Our scientists have made fundamental discoveries in the recent years which are now about to pay off with a large-scale commercial application for a unique biodegradable plastic. Later today you will hear Dr. Grant Brewen, President of BRDC, describe this exciting work and tell you more about his organization and the commercial prospects for these inventions.

DEATH VALLEY AND TECHNOLOGY TRANSFER. While I have related some of our successes in technology transfer, let me turn to a difficulty which we have seen during our work over the past decade. It has been our experience in several technologies that the ability to get from a scientific idea, to a commercial concept and then to a marketed product has been difficult if not impossible. This problem area is often referred to as "Death Valley", where promising technologies die for a lack of investment capital needed for commercialization. In a way, it is the classic chicken or egg dilemma. Often times a development facility is needed to produce enough material to convince customers that the product performs as advertised. But without a guaranteed customer, no one can afford the risk to build a plant.

In the course of commercialization, ARS CRADA partners or potential licensees must conduct Demand Analyses for the product or process being developed under technology transfer agreements. This means that the differential advantages in product or process performance must be demonstrated and measured to establish the relative commercial value of the technology. To do this, the technology must be implemented or used in a customer's manufacturing system to make appropriate comparison tests to determine the financial benefit of the invention. In addition, the partner must determine if the scaled-up technology can be produced or operated in a profitable manner.

This process to establish the value and demand of a technology is often very difficult for many small business partners and entrepreneurs who work with ARS. These partners are at an extreme disadvantage in this regard compared to large, well capitalized companies. The problem is that small amounts of samples can be produced in ARS laboratory pilot plants and provided without charge to potential customers. However, in many cases substantial amounts of material must be produced to convince the customer that the material can be manufactured as claimed and that it will perform in the customer's operation. In addition, test marketing often requires that materials be sold to determine how much customers will actually pay for the material. Once the partner has determined that the demand and value of the technology warrants commercialization, the actual production facility can be built. It is common, however, that committed customers are required before financing can be obtained for the construction of this facility. Thus, without the capability to produce commercial product to test market, technologies often fail in this final step of the technology transfer process.

Currently, government facilities are not used to produce products to be sold in the market place. This final step in the transfer and commercialization of ARS technology is very important. By test marketing products, customers can be lined-up and commercial commitments made so that financing can be obtained to construct the actual production facility. When this happens, the technology transfer process is completed as the private sector partner builds and operates a production facility.

We anticipate that NCAUR may soon have an important tool to bridge Death Valley. We will soon begin a multi-phase renovation of our pilot plant. A modular pilot plant for chemical and biological processing has been designed with four flexible bays for scale-up research and proof of concept work, along with laboratories for materials testing and evaluation. Through partnership agreements, the private sector will share in providing funds, manufacturing and production equipment, and technical support to advance the commercialization of specific ARS technologies. This approach will enhance technology commercialization through sharing of both resources and risk.

Exactly how the new pilot plant facility, and others like it, will operate under current technology transfer authorities remains to be established. However, ARS has shown that it can develop technologies from fundamental research findings and use legislative authorities for successful technology transfer to the private sector for enhancing the agricultural economy and increasing the nation's global competitiveness.

SUMMARY. Today I have tried to sketch the history of technology transfer legislation as it impacts the Agricultural Research Service and the National Center for Agricultural Utilization Research. We have been successful in using the laws as Congress intended to ensure that publicly funded, fundamental research is made available to the private sector and that the American people benefit. Research is a sound investment. The four USDA Utilization Laboratories offer outstanding examples of how directed, problem solving research, which begins with fundamental knowledge, can be brought to the marketplace.With just more than 10 years experience with the FTTA, we have demonstrated the benefits of that legislation. We look forward to continued success in the science of discovery, the development of this fundamental knowledge and ultimately bringing innovative products and processes to the marketplace, thus, serving the American people by enhancing the nation's economy and the agricultural sector in particular.

STATEMENT OF DR. BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman, I am delighted to be with you today to talk to you about the binational Agricultural Research and Development program (BARD). I am Dr. Bob Robinson, Administrator of the Cooperative State Research, Education, and Extension Service (CSREES). The mission of CSREES is to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and extension programs in food, agricultural, and related sciences in partnership with the public and private sectors. Within the CSREES mission, BARD is a competitive research grants program that supports fundamental research in the areas of animal and plant sciences, economics, and engineering that are important to agriculture in both the United States and Israel.

FUNDING HISTORY. Funds in support of the BARD program are from two sources: beginning in 1977 when the program began, interest paid on an endowment fund jointly established by the United States United States and Israel. Both Israel and the United States have contributed equal amounts on two occasions to create a total endowment of $110 million. Starting in FY 1994, additional funds provided directly by the United States and Israel have significantly increased funding for BARD grants. An additional $2.5 million was provided by the United States in both FY 1995 and FY 1996, and $2 million in FY 1997. The total amount available to the BARD program, including the interest earned on the endowment and funds provided directly from Israel and the CSREES, is currently over $12.0 million annually. Prior to the drop in interest rates in 1993, the greatest program funding available for BARD grants was in 1991, with a total of $9.4 million.

FUNDING PROCESS. Each grant application must be a joint effort by a team of U.S. and Israeli scientists. Each proposal submitted to BARD receives a peer evaluation. Only those proposals which are reviewed and considered meritorious are funded, and all proposals awarded by the BARD program must have significance to both U.S. and Israeli agriculture. While many U.S. institutions receive funding through BARD, the majority of funding, however, goes to the Land Grant Universities and the Agricultural Research Service. The CSREES direct appropriation to BARD is used to fund Land Grant institution grants.

ACCOMPLISHMENTS. Much of the research supported by the BARD program concentrates on issues of animal and plant health (including studies of the pests and pathogens of both plants and animals), and responses of plants to environmental conditions (particularly crops grown in warm, dry climates). Many accomplishments in fundamental sciences have been made in these areas that will lead to the development of crop plants resistant to disease, pests, and hard environmental conditions; reduction in livestock diseases; and increased livestock production. BARD research grants have led to: the discovery of a powerful antiviral substance in tobacco plants that can be used to protect tomato plants; the development of a vaccine against Rift Valley Fever, a debilitating disease of cattle, sheep, and even humans; andthe development of a method to help pecan growers in the American Southwest deal with the damaging effects of soil salinity, which previously caused premature death and stunted growth of pecan trees as well as low yields. The new method saved the trees and returned them to full production.

TESTIMONY OF J. GRANT BREWEN

My name is J. Grant Brewen, president and CEO of Biotechnology Research and Devleopment Corporation in Peoria, Illinois.

It was 12 years ago that a group of businessmen and executives from Peoria, IL and the USDA, Agricultural Research Center in Peoria developed a unique concept for a research and development consortium. These people recognized that three important entities, private, Federal, and State, needed to work much closer in order to transfer technology more efficiently from the public to the private sector where it could be successfully commercialized.

The need to carve out proprietary positions by the private sector led to the Technology Transfer Act of 1986 which was initiated by Rep. Robert Michel, Minority Leader of the House, with support from Senator Robert Dole and Rep. Richard Durbin.

The vision of these individuals could not have been more on target. Today every Federal research organization is actively engaged in Cooperative Research and Development Agreements. There is a Federal Laboratory Consortium for Technology Transfer, and the administration has suggested that twenty percent of each agency's research expenditures should be dedicated to cooperative endeavors with the private sector.

Today, nine years after its inception, BRDC and ARS have forged a partnership that is viewed as perhaps the most successful example of technology transfer in the nation. This partnership in research and commercial development will become stronger with the Congress' support and continue to demonstrate that at least one American model can compete effectively with the established government/industry coalitions prevalent in Europe and Asia. This partnership provides:

Synergies that arise from the application of seemingly unrelated disciplines and therefore put non-US companies at a competitive disadvantage.

Synergies that lead to efficient commercialization of ARS technology.

Leverage for base-line financing during early stages of development.

Risk reduction.

Technology platforms for new business opportunities.

The Biotechnology Research and Development Corporation is a privately owned for profit corporation. Its principle purpose is to discover and fund technology that holds promise to make a significant impact in the international market place. BRDC, by virtue of its founding charter and current partnership with the United States Department of Agriculture's Agriculture Research Service focuses its research and development activities on agricultural based technologies with an emphasis on finding new opportunities for commercial exploitation of renewable commodity agricultural products be they plant or animal based. In this sense BRDC looks toward developing technologies that will provide more environmentally friendly production of crops, new, or alternative, uses of commodities and safer methods of production and delivery to the consumer.

To date BRDC has funded 130 research projects at 37 institutions at a cost of $28,325,500. This research funding has resulted in the filing of 230 patent applications. Forty-nine of these have been allowed with 43 issued; and 84 currently being actively prosecuted. Many of the patented, or to be patented, technologies have been licensed. BRDC has entered into 49 license and option agreements and is finalizing negotiations on an additional 4 license and option agreements. The technology involved ranges from a promising therapeutic, that is currently in clinical trials, for human immunodeficiency virus the causative agent of AIDS, to a new genetic regulatory element for plant genetic engineering that has either been licensed, or is being evaluated, by 80 percent of the worlds plant biotechnology/seed companies. BRDC funding has resulted in technologies that predict litter size in swine, an effective vaccine against cattle shipping fever, a method of cloning swine and a brand new starch/synthetic polymer that possesses the mechanical and strength properties of polystyrene and polyethylene and is 100 percent biodegradable.

Time and space constraints prohibit a lengthy monologue on the positive metrics of the BRDC/ARS/academia partnership. Instead Appendices A through C provide a detailed accounting of revenues received, research and intellectual property protection expenditures, licensing activities and BRDC's widespread geographic and technology activities. The remainder of the time will be dedicated to one particular technological advance that has been the product of the synergistic partnership of BRDC, one of its private sector shareholders, and National Center for Agricultural Utilization Research.

In 1995 the United States consumed approximately 15 X 109 pounds of low density polyethylene, linear low density polyethylene, high density polyethylene and polystyrene. Yes, 15 billion pounds of nondegradable plastics. Of this total, approximately 8 billion pounds were used for packaging, agricultural mulch, trash bags, retail bags, food service and food packaging. For example, before they switched exclusively to paper based packaging, McDonald's Corporation used in excess of 100 million pounds of polystyrene to serve their Big Macs, Quarterpounders etc. Multiply this by three and you have a rough estimate of the volume of material the fast food industry consumes each year.

Twenty years ago scientists at NCAUR began an extended research program to incorporate starches, and other plant derived polysaccharides, into petroleum based synthetic polymers. The objectives were price reduction, environmental considerations, and new uses for agricultural commodities, not necessarily in that order. Although successful in their efforts, the scientists produced a product that had, with a few notable exceptions, less than desirable mechanical and/or strength characteristics and that was not totally biodegradable.

Several years ago scientists at The Dow Chemical Company, an original shareholder in BRDC, developed a family of synthetic polyesters that are completely biodegradable and compostable. These polyesters exhibited equal, or superior, mechanical and strength characteristics as compared to the materials I mentioned earlier. Unfortunately their cost made them commercially non-competitive. The DOW scientists tried what was obvious, they blended their materials with inexpensive fillers. The result was a less than desirable product. DOW brought the problem to BRDC and we went to the world's recognized experts in starch polymer technology, Dr. William Doane et al at NCAUR. Within one month BRDC was funding a research and development project designed to explore the use of starches and flours as inexpensive fillers in starch/polyester composites. Two months later BRDC began filing a family of patents on materials that exhibit mechanical and strength properties equal to, or greater, than polystyrene and are totally biodegradable and compostable. DOW has exclusively licensed the patents for the purpose of making loose fill packaging (packing peanuts, current volume is greater than 150 million cubic feet per year) and BRDC and DOW have agreed, in principle, to the terms of a nonexclusive license for all fields of use for these materials. DOW has entered into a joint development agreement with a third party to develope the technology for food applications and another BRDC shareholder is monitoring these developments very closely.

It is not unreasonable to expect that within the next five to ten years 10 to20% of the 15 billion pounds of environmentally unfriendly petroleum based products will be replaced by this technology that is substantially based on a renewable resource grown by American farmers.

This brings me to a significant point in this testimony. Dr. Johnsen's comments clearly delineate the strategy and benefits of the establishment of a pilot plant at NCAUR that will enable ARS to interact with private sector partners to develope and scale up promising new technologies. To be specific, let us examine the starch/polyester technology. DOW addresses markets that will use tens to hundreds of millions of pounds of their polyester resins. There are, however, dozens of applications for this technology that will utilize several millions of pounds of the blend. Some of these uses are, for example, planting pots that major forestry companies can use in planting seedlings, shotgun shell wadding, disposable pen blanks, ink cartridges for printers and copy machines etc., etc. Each of these applications will present its own unique developement requirements. The NCAUR pilot plant will enable ARS and BRDC, in their partnership, to address these niche applications of this technology through cooperative development agreements with small companies. In addition, it is our mutual intent to spin off start-up companies in the Midwest that will address these market opportunities either as a seller of product or a provider of custom blends that will be used to manufacture a consumer product.

Please be reminded that government/private sector partnerships benefit everyone, particularly the consumer and wage earner. BRDC and ARS have demonstrated that this unique partnership can produce results that benefit every segment of our society, from environmentalist to a Fortune 25 corporation.

TESTIMONY OF NYLE WOLLENHAUPT, STAFF SOIL SCIENTIST AND AGRONOMIST FOR AG-CHEM EQUIPMENT CO. INC.

Mr. Chairman, distinguished members of the Subcommitee, thank you for allowing me the opportunity to appear before you today to speak to you about the importance of continuing agricultural research and the exciting technological changes occurring on the farm today and in the near future. My name is Nyle Wollenhaupt. I am the staff soil scientist and agronomist for Ag-Chem Equipment Co. Inc. Ag-Chem is an agricultural machinery manufacturer, which markets a line of high flotation, self-propelled, farm input application equipment primarily to fertilizer dealers and custom applicators. Ag-Chem is a leader in bringing precision technologies to agriculture to assist in the site-specific application of plant nutrients and crop protectants. I am here on behalf of The Fertilizer Institute, a voluntary, non-profit association whose members represent manufacturers, traders, retail dealers and distributors of plant nutrient materials.

Mr. Chairman, as you know, agricultural research and America's food and fiber production system is a corner stone of the productivity, wealth and security of our nation. During World War II, American consumers spent as much as 40 percent of their income on food. Today, the average consumer in this country spends only about 7 percent of their disposable income on food. Instead of using the bulk of their incomes to buy the necessity of food, Americans now have far more disposable income to buy newer, larger and better homes, new cars and sport utility vehicles, travel, college education for their children and even home computer systems. One can think of this transition as a huge financial transaction over the past 50 years the American farmer giving the U.S. Baby Boomer generation a multi-trillion dollar gift to improve their lives, educate their children, have more leisure time and grow our economy to the world leader it is today. And it all started with agricultural research.

In just 50 short years, American farmers have gone from horse and animal power to complete mechanization, from moldboard plowing in the 1950's to conservation tillage in the 1990's. And as important as these revolutions are, we're discovering that they are only the beginning. The latest revolution is the use of emerging technologies that allow farmers to gather information for each area of a field, and to manage each area according to its needs and limitations. We call this site-specific management using precision technologies.

These new technologies and practices include the use of global positioning satellites (GPS), digital field mapping, geographic information systems (GIS), grid soil sampling, variable rate seeding and fertilizer application, field computers for pest scouting, on-the-go yield monitoring, satellite livestock tracking, and computerized field history and record keeping. And these are just a few of the next generation tools that are beginning to be used in agriculture today.

These technologies allow the agricultural producer to document the many variables that influence crop production and make adjustments within the farm field, with a spatial accuracy of 3 to 5 meters. Today, farmers are beginning to map crop yield as the combine travels across the field. In the future, soil properties and crop pests may also be mapped while driving across a field or from remote sensing. In short, each farm field using precision technology becomes a research plot. Crop, soil and weather data collected over multiple growing seasons becomes the basis for adjusting important agronomic inputs such as crop variety, plant nutrients, crop protectants, irrigation water, fuel, time the list goes on.

These precision farming tools are already proving to help farmers increase field productivity, improve input efficiency, protect the environment, maximize farm profitability and create computerized field histories and farm plans that have the potential to help increase land values, aid in getting farm credit loans and reduce regulatory bureaucracy. Collectively, these and other emerging technologies are being used in a holistic, site-specific systems approach called Precision Agriculture. Progressive and production minded farmers are already using some of these technologies. In a decade they may be as common place on the farm as air-conditioned tractor cabs and power steering.

The benefits of site-specific farming can vary greatly by farming region, types of soil and crops grown. The following examples illustrate how areas and conditions can benefit from site-specific agriculture.

Corn-Minnesota

Potential added value associated with site-specific N rate management ranged from $4.45 to $29.15 per acre above conventional uniform rate recommendations.

Spring Wheat-Montana

Gross return for variable an fertilization when nitrogen rate was based on test from the top two feet of soil.

Winter Wheat-Washington

Results based on field research indicate that variable fertilizer rates increased net returns over conventional management practices in Eastern Washington by $14.80 and $3.39 in 1990 and $11.92 and $10.00 in 1992.

Corn-Kansas. Variable rate technology was shown to reduce the number of acres in the field that are either over- or under-applied.

Sugar Beets-Red River Valley, North Dakota and Minnesota. Yield and quality results show a Variable Rate Technology nitrogen management advantage over conventional single rate management. Net return per acres results are Univ. of MN (1994) at $75/ac, Univ. of MN (1995) at $48/ac, NDSU (1994) at $51/ac and (1995) at $52/ac.

Potatoes-Idaho. Returns to risk and management were $368.17/acre greater for a "precision ag" managed center irrigation pivot versus a "conventional" managed pivot.

Many of the above studies report profitability from managing only one crop input variable. The more variables managed in a growing season the greater the profit potential.

The greatest benefit from site-specific management may be from improved environmental stewardship. Targeting crop inputs to only those locations in a field where they are needed results in unnecessary over- or under-application associated with only applying a single rate across an entire field. In their work at Kansas State University, J.B. Sisson and J.L. Havlin have shown that the benefits of variable fertilizer application based on soil variability include: Increased fertilizer use efficiency, reduced nutrient overloading in surface water from soil runoff and potentially the reduction of nitrate movement in groundwater. Through site-specific management, areas more sensitive to leaching or surface runoff can be located and properly managed.

The adoption of precision ag technologies is beginning to proceed at a rapid rate. It is estimate that as many as 25 to 30 percent of our most efficient and productive farmers are utilizing various new technologies including yield monitors, grid soil sampling and variable rate nutrient application. These numbers are consistent with a Farm Chemical/Purdue University dealership adoption survey that shows about 40 percent of the fertilizer and crop protection product dealerships offering geo-referenced (grid) soil sampling and about 30 percent offering computer/map controlled variable rate, single product applications. These numbers are up about 20 percent from a similar survey in 1996. "Growth in variable rate application is expected to continue, with the biggest expansion foreseen in multi-nutrient controller-driven application" (Farm Chemicals, June 1997). All of this growth has created a large demand for equipment operators with computer and electronic skills to more college graduates in agriculture to assist farmers with the wealth of data that is created with the new technologies. The demand has caught many education institutions by surprise.

The growth of dealerships offering various new technology based services means that most farmers will be able to obtain the benefits of precision ag technologies with little or no capitol investment. Learning how to use precision ag technologies and the data created by these technologies to make better agronomic decisions will create new opportunities for colleges, universities and the Extension system.

Legislatively, Ag-Chem Equipment Co. Inc., The Fertilizer Institute, and its members in the agricultural input retail sector support H.R. 725, "The Precision Agriculture Research, Education, and Information Dissemination Act of 1997." We commend the leadership of Rep. Lewis and Rep. Crapo for introducing the legislation and their leadership and foresight in this important new area of agricultural research. We also commend the many members of the House Agriculture Committee for cosponsoring this important piece of legislation.

Many farmers and the agricultural input retail dealers that serve them are already using new space-age technologies to map farm field and variably apply nutrients and other crop inputs. These technologies work to reduce unwanted runoff, protect the environment and to make farming operations more efficient, productive and profitable. It is important for the Department of Agriculture and the Federal agriculture research community to keep pace with farmers and the private sector regarding these innovative and advancing electronic farm tools.

As I understand the bill, H.R. 725 introduces and emphasizes precision agriculture in the USDA National Research Initiative. The bill most importantly defines precision agriculture as a system designed to increase long-term, site-specific and whole farm production efficiencies, productivity and profitability. And the bill works to maximize involvement, cooperation and public/private partnerships with private industry, certified crop advisers and others in USDA research projects and education programs regarding precision agriculture.

As you well know Mr. Chairman, Federal resources are limited and agricultural research opportunities are vast and becoming increasingly more important. Public/Private research partnerships are becoming increasingly more important in order for American agriculture to maintain and advance its cutting edge advantage of feeding the world in the most environmentally sensitive way possible.

American farmers in the next century will depend on these new technologies and all the other available tools at their disposal to compete in the international auction ring that is today's global market place. American farmers will, without hesitation, step up to the challenge to feed and serve the growing number consumer whose very lives depend on this nation's agricultural productivity.

As Congressman Lewis has pointed out in many of his statements, the United Nations estimates the world's population could climb from 5.6 billion people last year to more than 9.8 billion people by the year 2050. The planet's population is projected to grow by about 85 million people a year for two to three decades. Ninety percent of that will occur in the Third World, approximately doubling the demand for food there by the year 2025.

The earth's population is almost certain to double in the next century. One report estimates that the world's farmers will be asked to produce as much food in the next 40 years as they have in the entire 14,000 year history of agricultural production. World population is increasing, third world diets are improving requiring more meat and more grain to feed livestock. Those are facts that must be faced by our agriculture production system and the Federal agriculture research community.

Efficient and productive American farmers will be called upon to feed this tired and hungry world as they have done in the past, as they do today and as they will no doubt will be called upon to do in the years and decades to come.

To conclude, allow me add that I understand that regarding reauthorization of the farm bill research title, there is an overwhelming influence toward the status quo. While research grant recipients are unhappy that more Federal dollars are not available, they are generally happy with the current system and want to keep what they have. I urge the committee to resist the rubber stamp approach to research reauthorization. There are many new and exciting areas of research and agriculture production that the Department of Agriculture should be capitalizing on and are not. I believe Precision Agriculture is one of those areas and I urge the Committee to include H.R. 725 in its passage of a agricultural research legislation this year.

Again, thank you Mr. Chairman for the honor and opportunity to be with you here today. I'm happy to answer any questions the committee may have at the appropriate opportunity.

TESTIMONY BY LAMESA COTTON GROWERS

Lamesa Cotton Growers is a regional producer organization representing cotton producers on the South Plains of Texas. Our beginning dates back to the 1950's. Local agricultural leaders organized to insure that a USDA cotton classing office would be part of the cotton infrastructure in our area. Through the years our organization has successfully worked to keep a classing office at Lamesa.

In 1980 Lamesa Cotton Growers reached agreement with USDA to build a new $1.7 million cotton classing facility. It was equipped with the latest technological advancement in cotton classing, High Volume Instrumentation (HVI). This new method of classing gave us more accurate and detailed information about cotton fiber than ever before. Our organization purchased 10 HVI lines making it the worlds first fully automated classing office. Our early commitment to this new method of classing paved the way for HVI to quickly become the standard in our industry. It has truly revolutionized the cotton industry.

Our organization retired the debt on the Lamesa Cotton Classing office in 1990. The Board of Directors agreed to invest the cash flow from the building rental in agricultural research. The Agricultural Complex for Advanced Research and Extension Systems (AG-CARES) is a cooperative effort involving the Lamesa Cotton Growers (LCG), the Texas Agricultural Experiment Station (TAES), and the Texas Agricultural Extension Service (TAEX). Several private businesses and suppliers of agricultural products also participate. We have now completed our seventh year of operation and submit with this testimony seven years of annual reports documenting the results of that operation.

AG-CARES brings enhanced scientific technology to focus on the sandy soils of Dawson County. Advancement from over six years of Farming Systems research comes together at AG-CARES. These advancements came out of small plot work done at the Lubbock Experiment Station. These systems are incorporated at full scale, under our growing conditions.

This 240-acre research farm is well located and easily accessible to area producers. LCG provides the land that is cash leased, a Low Energy Precision Application (LEPA) irrigation system, and operations funding. TAES provides the systems plan and a team of research scientists to monitor the interactions within the systems. TAEX provides on site management and extension capabilities to conduct field trials, tours and reports. Various farm inputs are contributed by local businesses and private industry.

One key to success of our operation is the steering committee made up of members of each organization. The committee reviews past year's results, identifies research priorities and communicates who does what the next year. In 1994, the USDA Superior Service Award for Scientific Research was awarded to the AG-CARES Farming Systems Group. Over time this approach has developed into a close working relationship among the organizations. Each group is accountable to the other for results.

I offer three reasons why we feel AG-CARES has been successful and why we are working on a long term agreement to continue its operation.

(1) Operation of the farm has produced results immediately adaptable by local producers. This research is conducted where we farm, on our soil types and under our growing conditions. Systems that work here are adaptable to our operations. When we began in 1990 there was less than 50 irrigation systems in Dawson County. As of January 1, 1997 there were 429 LEPA irrigation systems covering 52,524 acres. This has stabilized production in our area and provided more crop alternatives to producers.

(2) The farm generates its own research priorities. When production problems arise from the implementation of new systems, those problems become the next research priorities. Supplemental additions of phosphate fertilizer are being used, a practice widely thought to be profitable for our area. However, researchers here have not measured any economic benefit from this practice. Why? What are the interrelated factors preventing phosphates from working here as they do under small plot trials? This becomes a research priority for the future.

(3) AG-CARES location allows quick response to changing conditions. For the first time in our history, the boll weevil has established itself on the High Plains of Texas. Confirmation came early this year by observing overwintering trap data. As a result the steering committee has set aside dry land acreage at AG-CARES to receive a variety of boll weevil treatments. We need to quickly determine what level of control is possible and affordable on lower yielding dry land cotton. These treatments begin this week.

What is in our future? Extreme yield variations are documented within short distances across the different cropping systems. New precision monitoring devices will be used to isolation and research of the factors responsible for these variations. This could allow the precision application of crop inputs and could dramatically improve yields. This precision farming project is planned to begin in 1998. We expect that this will increase the number of private companies who participate with us.

Again we point out our unique funding situation. Without the income provided LCG by the rental of the Lamesa Cotton Classing Office, we could not provide the location for this project. Likewise, public funding sources are necessary for the Experiment Station and the Extension Service to fulfill their commitment to this project. Private industry is most welcome to participate with us at AG-CARES. However, we feel it is through public funding of agricultural research that producers can be assured of objective information and results.

ANSWERS TO QUESTIONS FROM CONGRESSMAN GEORGE E. BROWN, JR., FOR JOHN MARTINELL:

(1) You indicate on page 2 of your testimony that one of the objectives of the joint efforts of USDA and DOE scientists is "to reduce agriculture's reliance on fossil fuels and other energy intensive inputs." What projects has INEL undertaken with USDA that are focused on this particular goal?

As stated in your question, energy efficiency is one of the collaborative objectives of the Memorandum of Understanding between the Departments of Agriculture and Energy. INEEL's Site Specific Technologies for Agriculture project (SST4Ag), which is a collaborative effort among INEEL, USDA/ARS, university and private sector scientists, engineers and producers, addresses this objective through research and development directed at decreasing the amount of energy required to support production of farm commodities through better understanding and management of planting, irrigation, chemical application and harvesting operations. Intrinsic to this research and development effort are integral benefits associated with environmental stewardship of the natural resources required for continued production of increasingly larger amounts of food and fiber needed to support global population increases, and enhanced economic efficiency for the US producers in an increasingly competitive international economic environment.

(2) In your testimony you refer to "the model for a precision agriculture system." Please define what your vision of this model is.

Our vision of the "precision agriculture system" is a system that enables the almost instantaneous collection and utilization of increasingly detailed information at every point along the production and marketing chain, and should empower ALL producers, suppliers, processors, retailers and consumers to benefit each other while acting in their own enlightened self-interest. The realization of such a vision requires more than a few new high technologies. Thus a realistic precision agriculture model for the food and fiber production, processing and distribution system of the 21st century, must harnesses computer, telecommunications, remote sensing, global positioning and other advanced technologies with the tools of agronomy, finance, marketing, machinery and education to better characterize, define and manage the food and fiber chain from the farm gate to the kitchen table. To achieve these purposes, research, and particularly education and extension, must include growers and agri-industry as partners to achieve rapid and effective adoption of such a precision agriculture system. This is essential since discovery and innovation often occur at the user level, and the user community's understanding of new non-traditional processes and technologies must expand to reap the benefits of precision agriculture in all sectors of society.

(3) On page 3 of your testimony you state: "the need for a collaborative, information-intensive effort to integrate precision agriculture research will require innova-

tive applications of systems integration and public/private partnerships focused on a defined end product to generate a usable precision agriculture system in a shorter period of time and at less cost to the Nation." GPS technologies, traditional farm equipment technologies, GIS and other information technologies appear to have been integrated with agronomic research over the past few years to meet farmers needs. What specific deficiencies are you referring with regard to the integration of precision agriculture research? What is the "defined end product" you envision? Precision agriculture is already in use. What are you specifically referring to when you refer to a "usable precision agriculture system?"

Gaining the full potential benefits of precision agriculture management approaches is dependent upon much improved, science-based understanding of many phenomena and their interactions. Integrated development and refinement of a number of tools, both analytical and hardware, is also required. There is an incomplete understanding of the inter-relationships between components of the agri-ecosystem climates, soils, crops, water, air, pests, and other conditions and organisms. Remote and in situ sensors, computer-based modeling and analysis technologies, decision-making tools, and information collection, organization, and dissemination are all increasing our ability to study and understand these complex agronomic systems. However, an "end product" of a widely applied and effective precision agriculture system, as described in the answer to question #2, that empowers producers, suppliers, processors, retailers, and consumers to benefit each other and the environment while acting in their own enlightened self-interest will require the integration of these tools along with the science-based information and data bases to support them. The precision agriculture system is only "usable" to the extent such an integrated science-based understanding exists, and per our vision, application of fertilizers is just the beginning.

The measurable benefits of a precision agriculture system usable by the entire agriculture system are legion. For the farmer and livestock producer, precision agriculture could result in increased profitability by lowering production costs and identifying new markets for his commodities. For the processor, precision agriculture could help locate commodities that best fit manufacturing specifications and assure their timely arrival at the processing facility. For the retailer, precision agriculture could generate a more flexible distribution infrastructure that responds rapidly to changing consumer tastes and weather-driven supply problems. For the environmentalist, precision agriculture could help mitigate degradation of the soil, water and air and preserve other natural resources by prescribing and delivering precise, site-specific consumption/applications of petroleum, chemical and other inputs. For the consumer, precision agriculture could enhance the safety and nutritional quality of food by precisely managing and accounting for the usage of pesticides and fertilizers, tracing and preventing the origins of bacteria that have contaminated a food item and assuring appropriate handling practices that preserve nutrients and guard against the introduction of pathogens into the food supply.

(4) On page 4 of your testimony you state, "Use of systems analysis and engineering techniques will assure focus on the real issues;" What are the real issues?

The rapid globalization of the U.S. economy and decreasing Federal role in agricultural markets are increasing the risks the agriculture industry must manage. These risks are further compounded by an increasing regulatory role of governments regarding agriculture's impacts on the natural environment and human health. Precision agriculture, strongly supported by industry and being adopted by leading growers, is expected to address these stresses.

However, the greatest barriers to using precision agriculture are the complexity of the system relationships and the holistic systems-level integration required to develop solutions. The use of systems analysis and engineering techniques will focus on integrating systems to manage the increasing burden of risk associated with producing and getting agriculture products to market.

Using this collaborative systems-based approach is required for achieving solutions to interrelated problems, and this approach can be focused on the integration of precision agriculture systems. Furthermore, a systems-based approach will promote collaborations to reduce redundancy, open communications to improve efficiency, and brings together a unique critical mass of multidisciplinary expertise to define interfaces and relationships among elements of the system. This approach is also a cost-effective strategy for integrating and applying our national wealth in research, education and extension to more effectively respond to customer needs for integrated technology products and to get those products to market sooner and at less cost.

(5) We currently have an extensive system of agricultural experiment stations and Agricultural Research Service laboratories, being supported at a rate of many hundreds of millions of public dollars per year. Why is this existing agriculture research

system not meeting the needs outlined in your testimony? What changes should we make to this system in order to meet the needs of precision agriculture?

The current mix of USDA funding mechanisms for agriculture research and development—formula funds, competitive grants and special grants—were developed to address problems of the agricultural industry and have served our nation well. However, as the U.S. food and fiber system positions itself to enter the 21st Century, a new set of challenges has emerged that require new approaches that build up on the strengths of these existing mechanisms.

These new approaches must provide incentives for cooperation and collaboration between the private and public sectors, among State and Federal Governmental organizations, between Federal and university research facilities, and among diverse academic disciplines to bring together the resources and disciplines necessary to address complex national problems. These new approaches would build a secure linkage between basic and applied research, as well as securing strong linkages between the development of new technologies and the development of education and training programs to transmit new technologies. Furthermore, through multi-institutional collaborations, individual institutions could become more specialized and at the same time enhance available expertise and services to local constituencies.

Precision agriculture is a mission area that requires this new level of coordination and integration. However, it is important to emphasize that this approach could be applied to other subject mission areas that are national in scope and require the pooling of resources and a wide variety of expertise in order to achieve desired outcomes. Examples of such mission areas include food safety, food and fiber genome mapping, livestock waste reduction and disposal, hypoxia, and alternative uses for crops and livestock products.

A proposal for such a new approach is outlined in an attached white paper entitled, "Mission-Oriented Research, An Innovative Funding Opportunity For National Missions Such as Precision Agriculture." This proposal is included in this response as an attachment since it has already been submitted to the Subcommittee for the record of this hearing.

(6) You describe the need for public-private partnerships in technology development. Isn't the basis of a cooperative research and development agreement (CRADA)? Does your laboratory currently have CRADA's in the area of precision agriculture? Do other Department of Energy laboratories? If so, please provide a brief description of these CRADA's and their size.

INEEL has several CRADA's in place supporting precision agriculture product development and commercialization. Current CRADA's are individually focused per market drivers of the private sector and program requirements of the public sector. The SST4Ag project is the current means to integrate these individual efforts. Each INEEL CRADA supporting precision agriculture leverage equipment and labor (estimated in the $100,000's) provided by the partners with INEEL's equipment and labor (estimated in the $100,000's) and are briefly summarized as follows:

Local Farmer-experimental methods and developmental component evaluation site, supporting sensor, controls, information management and operational technique research and development.

Irrigation Sensors and Controls Company-irrigation and other farm operational equipment command and control systems.

Geographic Information Systems Company-information management, analysis and display systems.

Agricultural Sensors and Controls Company-farm equipment sensor, command and control systems.

Aerospace Sensors and Controls Company-farm equipment sensor, command and control systems.

A full inventory of all DOE laboratory CRADA's supporting precision agriculture technology development will require additional time. Such an effort would be enhanced through a request made directly to DOE.

Mention of specific company names requires the approval of the cooperating partners per the CRADA agreement, which could be provide with additional time.

(7) If the goal of this program is development of commercially viable systems of precision agriculture, developed in partnership with industry, why can't we handle the work through CRADA's? Isn't this the reason CRADA's were established?

Currently, the precision agriculture system is being developed on an ad hoc basis by many different groups who must satisfy their own requirements and who have little ability to control or address overall system requirements, and non-integrated individual investments in CRADAs is no exception. Without a research and development program to design the model for a nationally integrated precision agriculture system, individual CRADAs focus on the requirements of the few involved parties and lacks the resources or scope to integrate beyond their own market (private sector) or mission-focused (public sector) program constraints. This fragmented approach does not provide the synergy needed to build on the collective knowledge of all stakeholders in the system, nor integrate the efforts of several related CRADAs. A consciously-designed R & D initiative that concentrates on systems development, grows technologies that are needed to fill the gaps in the system and synthesizes new knowledge in cyclic iterations would be more likely to generate a usable precision agriculture system in a shorter period of time at less cost. The CRADA is a valuable tool in developing these public/private partnerships, particularly when managed as part of an focused R & D initiative for systems integrated products.

(8) Do you feel that industry funding match is warranted on grants and CRADA's in this area, given the maturity of the technology?

The maturity of a given technology is relative to the desired end or vision (see questions #2 and #3). The current maturity of precision agriculture systems is analogous to the telegraph and telephone systems of years gone by, while the vision is analogous to the telephone, Internet and other high-speed communications systems of today. Given the vision there is much to be done, therefore, not only is industry matching funds warranted, but required.

Historically, the Federal Government's investment in agriculture research and development has yielded some of the greatest returns on any Federal dollar spent. Yet the need and challenge to increase the return on that investment is ever increasing. The development of precision agriculture systems through partnerships between Federal agencies and the public and private sectors provides a path forward for achieving the greatest benefit from scarce Federal resources. In fact, the absence of such a collaborative systems approach could diminish the returns on current and future investments in agricultural research.

The Federal Government is ideally situated to serve as the catalyst for the development of a precision agriculture system. By providing some leadership and a modest amount of R & D funding, the government could encourage the formation of public/private sector partnerships to design a precision agriculture model in a more timely and efficient fashion and leverage private investment in the project so as to limit taxpayers' exposure. As a first step, solidifying the Federal partnership between the U.S. Departments of Agriculture and Energy, which partnership was created by a memorandum of understanding signed in November 1995, and making joint Federal investments in this collaborative partnership will enable a quantum leap in more efficient and responsible resource management and address immediately solvable problems faced by American agriculture in a global economy.

Mission-Oriented Research, An Innovative Funding Opportunity For National Missions Such as Precision Agriculture

New Challenges

Since World War II, the dramatic increases in agricultural productivity have been fueled by biological and chemical technologies. In the next half century, the prospects for advancements in the productivity of the food and fiber chain will be determined by the development of systems approaches and information technologies. These management tools will make ever-growing quantities of data available to the user by enabling the almost instantaneous collection and utilization of increasingly detailed information at every point along the production and marketing chain.

This systems-based, information-intensive management of the food and fiber chain is referred to as precision agriculture. Precision agriculture can empower producers, suppliers, processors, retailers and consumers to benefit each other while acting in their own self interest. Precision agriculture holds the promise of enabling the agriculture sector to increase its productivity and competitiveness in the global market place, while minimizing the degradation of the environment and enhancing the safety and nutritious quality of our nation's food supply. However, the understanding and application of such detailed information is not simple. There is an incomplete understanding of the inter-relationships between components of the agri-ecosystem " soil, crops, water, air, pests and other interacting organisms in the system.

Currently, the precision agriculture system is being developed on an ad hoc basis by many different groups who must satisfy their own requirements and who have little ability to control or address overall system requirements. This fragmented approach does not provide the synergy needed to build on the collective knowledge of all stakeholders in the system, nor the critical mass of capabilities and resources to overcome system integration barriers. What is required is a determined effort to organize these components into a usable system that can be easily accessed on a real-time basis and readily applied by users up and down the agricultural production and marketing chain.

In order to realize the potential benefits of precision agriculture, it is critical to initiate a research and development program to design a science-based model, including associated decision support tools and hardware, of a precision agriculture system that is applicable to the diversity of this nation's agriculture sector.

Funding Mechanisms

The current mix of USDA funding mechanisms for agriculture research and development—formula funds, competitive grants and special grants—were developed to address problems of the agricultural industry and have served our nation well. However, as the U.S. food and fiber system positions itself to enter the 21st Century, a new set of challenges has emerged that require a new funding approach. A new funding approach, which builds on the strengths of the existing mechanisms, is proposed herein to address complex problems that require cooperation and collaboration between the private and public sectors, among State and Federal Governmental organizations, between Federal and university research facilities, and among diverse academic disciplines. This new approach seeks to build a secure linkage between basic and applied research, as well as securing strong linkages between the development of new technologies and the development of education and training programs to transmit new technologies. Precision agriculture is a mission area that requires this new level of coordination and integration. However, it is important to emphasize that this approach could be applied to other subject mission areas that are national in scope and require the pooling of resources and a wide variety of expertise in order to achieve desired outcomes. Examples of such mission areas include food safety, food and fiber genome mapping, livestock waste reduction and disposal, hypoxia, and alternative uses for crops and livestock products.

An Innovative Funding Approach

Mission-Oriented Competitive Grants

The upcoming re-authorization of the Research, Extension and Education Title of the farm bill represents a unique opportunity for the Congress to develop new funding opportunities for mission-oriented research, including precision agriculture. This proposal is to authorize a mission-oriented competitive grant program at $100 million a year for five years.

These grants would be managed by USDA/CSREES. A special "Precision Agriculture Advisory Panel" would be created as a subunit of the existing National Agriculture Research, Extension, Education and Economics Advisory Board. Using precision agriculture as the example, this panel would augment the Board in the specific areas of expertise required for precision agricultural research, and would function only for the performance period of the precision agriculture grants. Leadership for this Precision Agriculture Advisory Panel would be selected from the National Agricultural Research, Extension, Education and Economics Advisory Board membership. This Advisory Panel leadership would then select panel members that would include mission-relevant representation from farm, commodity and livestock groups, other agribusiness organization, and private industry; with appropriate public sector representation from land-grant universities, Federal agencies and national laboratories. This new Panel would make recommendations to the Secretary of Agriculture and the Administrator of CSREES for the products to be solicited in a request for bids under this new funding mechanism. Based on these recommendations, USDA/CSREES would solicit bids for defined products. Advisory panels would be established for other priority mission areas, and all panels would follow the same procedure for making recommendations regarding the products that should be the outcome of work supported by the grants awarded in these mission areas.

The entire $100 million per year in this new program would be distributed among not more than five priority mission areas in any given year, and no less than $90 million per year would be targeted to large-scale multi-State and multidisciplinary projects. For these large mission-oriented research grants, the minimum size of grants would be $5 million each, with the maximum size being $25 million. The recipient(s) of the award(s) would have a performance period, to deliver the products of the proposed scope, of not more than five years. Of the $100 million, not more than $10 million per year could be targeted to a general call in support of the larger mission-oriented research grants for the respective priority mission areas.

Mission-Oriented Grant End Product

In the case of precision agriculture, the large multi-State and multidisciplinary grants could be targeted to designing the science-based model, including associated decision support tools and hardware, for integrating precision agriculture systems that are applicable to the diversity of this nation's agriculture system. The successful grantee's performance would be measured against the grantee's ability to develop and deliver the delineated end product.

Issuance of Large Scale Mission-Oriented Research Grants to National Consortia

The USDA/CSREES would publish a request for proposals from national consortia to execute and deliver the product(s) of the mission-oriented grant(s). The request for proposals would clearly define desired products and outcomes. Selection of a grantee would involve a rigorous competitive merit review process. Eligible grantees would be national consortia that demonstrate the partnerships and mechanisms to access and integrate regional, multi-State and multidisciplinary resources, institutions and capabilities necessary to develop and deliver the products of the mission-oriented grant. This would include, but would not be limited to, system requirements driven subcontracting, competitive peer-reviewed processes to access best performers of work for subcontracts, and an ability to integrate products of subcontracts and initiate subcontract change controls as system requirements evolve. The successful national consortium would be solely responsible and accountable to USDA/CSREES, and other funding entities, for the cost, schedule, scope and integrated delivery of the product(s) of the grant. Institutions performing work on the mission-oriented grant would be accountable to the national consortium for their respective defined scope, and the national consortium would have such oversight responsibilities only for the duration of the grant.

The USDA/CSREES shall require that the successful consortia leverage and integrate funds, infrastructure and capabilities. The intent of this requirement is to maximize the leveraging of other funds, infrastructure and public sector missions for the greatest return to the agriculture sector. The successful national consortium shall demonstrate capabilities and intent to meet the following requirements:

All projects must be multidisciplinary, multi-institutional, multi-State and include research, extension and education components.

Appropriate Land-Grant Universities in the involved regions/States shall be members of the consortium. Accordingly, the involved Land-Grants should be able to show an appropriate match in State and/or Federal base (formula) funds that they are contributing to the project. EPSCORE-like requirements shall also apply when selecting participating land-grant institutions. Established mechanisms and commitment to obtain matching funds must be clearly demonstrated by the national consortium, but fluctuations in annual funding cycles will be allowed for.

Appropriate private sector entities in the involved markets (technology, commodity, etc.) shall be members of the consortium. The private sector entities shall be responsible for an appropriate match of USDA / CSREES funds. Established mechanisms and commitment to provide private sector matching funds must be clearly demonstrated by the national consortium.

Appropriate Federal agencies and national laboratories (government-owned contractor operated or government-owned government operated) shall be members of the national consortium. Tne national consortium shall obtain appropriate matching funds from other Federal agencies, such as DOE, DOD, EPA or Interior for the duration of the contract. . Established mechanisms and commitment to leverage other public sector funding must be clearly demonstrated by the national consortium.

The mission-oriented competitive grant funds provided by USDA/CSREES are project funds. These funds cannot be used to purchase or build physical buildings or facilities; however, building and equipment overhead costs should be factored into proposals of this size. Funds for purchase or construction of buildings or facilities may not be counted as matching funds by the national consortium. These mission-oriented competitive grant funds may be used for equipment purchases as well as program activities.

The national consortium will be responsible to USDA/CSREES, as well as other public and private sector entities providing funding, to meet the respective mission-oriented requirements and maintain a full accountability of all funds. The national consortium shall be allowed to issue subcontracts of awarded funds to any qualified organization including Federal agencies, national laboratories, colleges or universities or research foundations maintained by a college or university, and private research organizations.

Linkage to Other Funding Mechanisms

The national consortium shall be required to submit an annual report to the USDA/CSREES to describe its progress in accordance with the Government Performance and Results Act and also to describe additional research and education needs that have been identified as a result of ongoing projects. This identification of research and extension needs will be provided to the National Advisory Board and the managers of the National Research Initiative (NRI).

Mission-Oriented Competitive Grant Funds

Funding for the mission-oriented competitive grants will come from the Fund for Rural America, which was created for the purpose of providing producers and processors with the technology and tools they need to compete and prosper. The objectives and intent of the Fund for Rural America are most closely related to this funding proposal, and precision agriculture achieves in great measure the missions set forth by the Fund for Rural America e.g., enhanced international competitiveness, rural development, and conservation of natural resources. Funding for this mission

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oriented competitive grant program through the Fund for Rural America should be for not less than 5 years.

Statement

of

Mr. John Martinell

Program Manager

Agriculture Programs

Idaho National Engineering and Environmental Laboratory

Operated by Lockheed Martin Idaho Technologies Co.

for the U.S. Department of Energy

before

The Subcommittee on Forestry, Resource Conservation, and Research

June 18, 1997

STATEMENT OF MR. JOHN MARTINELL

Mr. Chairman, Members of the Subcommittee: I appreciate the opportunity to appear before you today to discuss public/private sector partnership efforts in agriculture research, and how the Idaho National Engineering and Environmental Laboratory (INEEL), as one of the U.S. Department of Energy's civilian-operated national laboratories, is applying its multi-disciplinary expertise and capabilities through such partnerships to address large-scale, complex challenges faced by agriculture. One of the areas in which the INEEL is focusing these capabilities through effective partnerships is precision agriculture systems. Precision agriculture, simply put, is the integration of new space-age information gathering technologies with traditional agronomic tools to better manage individual farming operations.

Since World War II, the dramatic increases in agricultural productivity have been fueled by biological and chemical technologies. In the next half century, the prospects for advancements in the productivity of the food and fiber chain will be determined by the development of systems approaches and information technologies. These management tools will make ever-growing quantities of data available to the user by enabling the almost instantaneous collection and utilization of increasingly detailed information at every point along the food production and marketing chain.

This systems-based, information-intensive management of the food and fiber chain is referred to as precision agriculture. Precision agriculture can empower producers, suppliers, processors, retailers, and consumers to benefit each other while satisfying their own individual interests. Precision agriculture holds the promise of enabling the agriculture sector to increase its productivity and competitiveness in the global marketplace, while minimizing degradation of the environment and enhancing the safety and nutritious quality of our nation's food supply. However, the understanding and application of such detailed information is not simple. There is an incomplete understanding of the inter-relationships between components of the agro-ecosystem -- soil, crops, water, air, pests and other interacting organisms in the system.

Nearly five years ago, as precision agriculture was just beginning to take hold, a group of USDA-Agriculture Research Service and university scientists, along with a few farmers and individuals from industry, approached the INEEL. They were seeking a broader range of multi-disciplinary expertise and technologies to begin adapting precision agriculture to crops grown in the Pacific Northwest. Less than six months after that initial contact, this unique partnership developed, tested, and implemented the first ever potato yield-monitoring and data management system on a full-scale production farm in Idaho. This partnership has evolved into an interagency, public/private sector collaborative precision agriculture partnership referred to as the National Site Specific Technologies for Agriculture (SST4Ag) project. The SST4Ag project functions on a full-size farming operation adjacent to the pristine Yellowstone National Park watershed. It is a comprehensive systems project that includes integrated research and development of site-specific technologies such as yield monitors for potatoes and small grains; geophysical sensors for non-invasive soil characterization; remote sensing and other environmental characterization techniques; and information management tools required to support farm management decision-making and operations within the context of the agronomy and ecology of the cropping system.

On November 2, 1995, partly as a result of the success of the SST4Ag project's collaborative approach to problem solving, the Departments of Agriculture and Energy signed a Memorandum of Understanding (MOU) that provides a framework for the two Departments' scientists and engineers to prepare U.S. agriculture for competition in the global marketplace and to reduce agriculture's reliance on fossil fuels and other energy intensive inputs. A copy of the MOU is attached to my testimony for the Subcommittee's review. As you will note, the purpose of the MOU is to stimulate greater cooperation and coordination between the Departments for the benefit of the agriculture sector. This partnership couples USDA's expertise in plant breeding, biological pest control, soil and water conservation, and other areas with DOE's expertise in systems integration, physics, engineering, and information sciences.

The horizon is full of complex challenges adaptable to inter-Department, as well as public/private collaborations, for agriculture research and development. None is more challenging, or potentially more beneficial, than precision agriculture. Currently, the precision agriculture system is being developed on an ad hoc basis by many different groups who must satisfy their own requirements and who have little ability to control or address overall systems requirements. This fragmented approach does not provide the synergy needed to build upon the collective knowledge of all stakeholders in the system, nor the critical mass of capabilities and resources to overcome systems integration barriers. Many of the components of precision agriculture have already been developed through substantial public and private sector investment. What is required is a determined effort to organize these components into a usable system so that the information provided is readily accessible to, and easily applied by, farmers, consultants, and/or agri-businesses on a real-time basis.

The complexity of precision agriculture demands the attention of a wide variety of disciplines. No one institution could ever aspire to attract the stable of disparate experts that would be necessary to design the model for a precision agriculture system. Therefore, novel partnerships organized around customer needs and system requirements are, and will continue to be, essential to realize significant gains in building a precision agriculture system. These partnerships often result in atypical alliances between those well established in the agriculture sector and those who are relative newcomers to agriculture, such as national laboratories, high-tech computer and software manufacturers, and the aerospace and other defense-related industries. Fostering these novel partnerships is not only critical to the advancement of precision agriculture but is also likely to generate new resources and capabilities that have never before been available to the agriculture community.

The federal government is ideally situated to serve as the catalyst for the development of a precision agriculture system. By providing leadership and focused blocks of research and development funding, the government could encourage the formation of public/private partnerships to develop a precision agriculture model in a more orderly fashion and to leverage private investment to maximize the benefit of limited federal research dollars.

Reauthorization of the Agriculture Research Title presents an ideal oppotunity to further the integration of public/private partnerships that extend upon USDA's current portfolio for agriculture research to develop precision agriculture systems. Existing USDA programs for funding agriculture research and development have evolved to become very effective in addressing specific elements of the agriculture community. However, the need for a collaborative, information-intensive effort to integrate precision agriculture research will require innovative applications of systems integration and public/private partnerships focused on a defined end product to generate a usable precision agriculture system in a shorter period of time and at less cost to the Nation.

Such innovative approaches would need to:

(1) expand applications of systems analysis and engineering techniques to fully define, prioritize and coordinate necessary research and development, with farmers and supplier requirements fully integrated;

(2) encourage the participation of all elements of the research community, including USDA, other federal and state agencies, national laboratories, universities, and those in the private sector;

(3) aggressively leverage private sector investment and identify additional federal funding from non-traditional sources which share an interest in the potential benefits of precision agriculture, without undermining the fundamental components of existing research, education and extension upon which the integrated systems based research will be built;

(4) establish the means to identify funding for specific initiatives of national scope -- such as precision agriculture -- in large, consolidated blocks that will enable multiple, jointly-funded institutions (including education and extension) to work through a collaborative, system-based approach, to accomplish critical mass levels of research; and

(5) demonstrate clearly defined end-products with quantifiable results and outcomes in a definable period of time with full accountability to USDA and other sources of funding.

Significant benefits can accrue from the application of innovative approaches which embody these requirements. Use of systems analysis and engineering techniques will assure focus on the real issues; provide a means to integrate necessary components of research; reduce duplication of effort and increase stakeholder acceptance. Bringing together and applying the full research and development capabilities available from both the public and private sectors reduces development costs and schedules by providing access to the specialized expertise and infrastructure necessary to satisfy systems based requirements. Integrating specific initiative research and development efforts with education and extension activities ensures that future generations will benefit from past and future public and private sector investments.

A mechanism that could provide the basis for developing and applying such innovative approaches could be developed within the recently created Fund for Rural America. Through restructuring and extension of the Fund for Rural America, a platform could be created which would address large-scale, multi-disciplinary projects through a competitively awarded, peer reviewed process. Application of such innovative approaches should seek to build a secure link between basic and applied research, as well as enhance the link between the development of new technologies and the development of education and training programs to transmit the new technologies. Precision agriculture is an area that requires this new level of coordination and integration, though it is important to emphasize this same approach could be applied to other areas such as a national food genome project, food safety, economically significant value-added products, and international competitiveness issues.

Without some type of mechanism that meets these requirements, the agricultural and research communities will be unable to fully realize the benefits that systems integrated, multi-disciplinary public/private sector collaboration have to offer. As reauthorization of the Agricultre Research Title moves forward, the INEEL looks forward to working with the Subcommittee and stands ready to offer its expertise in helping the agriculture sector position itself for the 21st Century.

Thank you again for the opportunity to present this testimony today.

MEMORANDUM OF UNDERSTANDING

between

THE UNITED STATES DEPARTMENT OF ENERGY

and

THE UNITED STATES DEPARTMENT OF AGRICULTURE

on

COOPERATION AND COORDINATION IN TECHNOLOGY RESEARCH, DEVELOPMENT, TRANSFER, UTILIZATION AND COMMERCIALIZATION

I. OBJECTIVE

The objective of this Memorandum of Understanding (MOU) is to establish policies and administrative methods that will permit cooperation and coordination between the United States Department of Energy (DOE) and the United States Department of Agriculture (USDA) in technology research and development, technology transfer, technology utilization, and technology commercialization activities. This cooperation and coordination will not be limited to the two departments, but each department, independently or jointly, may cooperate with other Federal departments and agencies; interested state, regional and local agencies; colleges and universities; industry; non-profit organizations; foundations and public interest groups. Both sides see significant growth opportunities for the U.S. economy, and the food and agricultural sector, in particular, from such new cooperation.

The purposes of the cooperation and coordination are: to facilitate cooperative technology, research, development, transfer, utilization and commercialization efforts; to ensure rapid technology transfer between USDA and DOE organizations; and to coordinate and jointly plan, as appropriate, research and development, technology transfer, outreach and related activities.

Specific interagency agreements between USDA and its agencies, and DOE and its laboratories and facilities, may be developed pursuant to this MOU to define specific undertakings. Such agreements may provide for the use of facilities, personnel, cooperative projects, and transfer of funds, and shall comply with the laws, regulations, and orders pertaining to the respective departments.

Details of the levels of funding support, to be furnished to one department by the other, will be developed and documented in specific interagency agreements or other agreements, subject to the availability of funds. This MOU will not be used to obligate or commit funds or as the basis for the transfer of funds. DOE and USDA will provide each other mutual support in budget justification to OMB and hearings before the Congress with respect to these joint programs.

II. AUTHORITIES

Nothing in this agreement alters the statutory authorities of DOE or USDA. This MOU is intended to facilitate cooperative efforts for mutual provisions of services and support and technical assistance by both Departments in the conduct of technology research, development, transfer, utilization and commercialization programs and activities. This MOU does not supersede or void existing understandings or agreements between DOE and USDA, such as the 1990 MOU among the two Departments and the National Science Foundation on energy, plant science, and genome research and development; the 1991 MOU between the two Departments on biofuels cooperation; and the 1992 MOU between the two Departments on science education. Rather, this new agreement provides general, broader coordinating guidelines and mechanisms.

III. RESPONSIBILITIES

A. The DOE agrees:

1. To designate the Associate Deputy Under Secretary for Operations, Office of Research and Development Management, to be the Point of Contact (POC) to coordinate technology transfer planning and cooperation in programs of mutual interest and, with the concurrence of the facilities concerned, assist in arranging inter-laboratory and site-specific supplemental agreements for technology research, development, transfer, utilization and commercialization-related projects of mutual interest at selected DOE laboratories and facilities and at USDA facilities, or other facilities, as appropriate. The POC will facilitate the exchange of data and technical information between the two agencies. The POC will represent all DOE programs, laboratories, and facilities involved in technology utilization and commercialization, technology transfer, and technology research and development appropriate for transfer.

2. To support selected USDA technology research, development, transfer, utilization and commercialization programs by providing technical expertise for performance, planning, review or consultation in areas of mutual interest, subject to program priorities and budget constraints.

3. To support the exchange of technical information -- through databases, information systems, clearinghouses, conferences, and other means -- on Research, Development and Demonstration (RD&D) and technology transfer opportunities and activities.

4. To assist USDA in the development of cooperative technology research, development, transfer, utilization and commercialization projects by providing pertinent available information about candidate USDA facilities and other potential sites and to support approved joint technology research, development, transfer, utilization and commercialization efforts at such sites by providing services, facilities, utilities, and other supporting resources. The details will be more specifically identified in supplemental specific interagency agreements.

B. The USDA agrees:

1. To designate the Assistant Administrator for Technology Transfer, Agricultural Research Service, to be the POC within the USDA Headquarters to coordinate technology transfer planning and cooperation programs of mutual interest and, with the concurrence of the facilities concerned, assist in arranging for supplemental agreements for related projects of mutual interest at selected USDA facilities and at DOE laboratories and facilities, or other facilities, as appropriate. The POC will facilitate the exchange of data and technical information between the two agencies. The POC will represent all USDA programs and facilities involved in technology utilization and commercialization, technology transfer, and technology research and development appropriate for transfer.

2. To support selected DOE technology research and development and technology transfer programs by providing technical expertise for performance, planning, review, or consultation in areas of mutual interest, subject to program priorities and budget constraints.

3. To support the exchange of technical information -- through databases, information systems, clearinghouses, conferences, and other means -- on Research, Development and Demonstration and technology transfer opportunities and activities.

4. To assist DOE in the development of cooperative technology research, development, transfer, utilization and commercialization projects by providing pertinent available information about candidate USDA facilities and other potential sites and to support approved joint technology efforts at such sites by providing services, facilities, utilities, and other supporting resources. The details will be more specifically identified in supplemental specific, interagency agreements.

C. The USDA and the DOE mutually agree:

1. That this MOU will be referenced in any supplemental agreements, amendments, interagency agreements, or letters of agreement prepared to document details of cooperative efforts carried out by the two Departments, pursuant to the objectives of the MOU.

2. That the Points of Contact designated by the two Departments under paragraphs III a.I and III b.1 will serve as chairs of a joint technology partnerships coordinating committee. The purpose of the committee will be to advance and promote joint technology research, development, transfer, utilization and commercialization efforts. Program planning and implementation will be covered in specific interagency agreements between participating programs, laboratories and facilities. The committee will meet at the call of the chairs, but at least semiannually. Membership in the committee and any subsequent subcommittee will be composed of full-time Federal employees and individuals in an officially-sanctioned status as collaborator, as deemed appropriate by the two Departments. Personnel under contract to either agency may participate to provide scientific and technical advice pursuant to Departmental taskings.

3. That they will cooperate in conducting joint outreach and other technology transfer activities involving mutually agreed upon DOE and/or USDA sites where significant technology transfer opportunities, and/or significant opportunities to present a wide range of technical information and technology applications, exist.

4. That each Department will routinely provide proposed outreach materials, press release, or other public affairs information related to joint efforts or projects for review and concurrence by the other agency prior to their release. Subject to the Freedom of Information Act (5 U.S. C. 552), each shall consult with the other prior to making decisions on disclosure of information to the public regarding projects and programs referenced in this MOU.

5. That appropriate patent and other intellectual property provisions shall be included in interagency agreements and any other agreements entered into by the parties in implementation of this MOU.

6. That each Department will ensure that there is sufficient funding to carry out projects that are mutually agreed upon in supplemental agreements under this MOU.

7. That any interagency agreements entered into in implementation of this MOU shall state the specific statutory authority for each Department to engage in the activities specified in the agreement.

IV. DURATION OF THE AGREEMENT

This memorandum of understanding may be amended by written agreement between DOE and USDA. This agreement becomes effective on the date of signature by both Departments. It shall remain in effect for a 5-year term from the effective date. This MOU may be terminated by the mutual written agreement of DOE and USDA or by either Department upon 90-day notice to the other Department.

HAZEL R. O'LEARY
Secretary of Energy

Mar. 2, 1995
Date

DAN GLICKMAN
Secretary of Agriculture

Mar [illegible] 1995
Date

Idaho National Engineering & Environmental Laboratory University Research Consortium Program

The University Research Consortium (URC) was created by Lockheed Martin Idaho Technologies Company (LMITCO) as a collaborative research program to strengthen Idaho National Engineering & Environmental Laboratory (INEEL) capabilities as a catalyst for long term economic growth in Idaho and neighboring states. It is expected that the technologies developed will apply to complex problems that pose challenges to the Department of Energy (DOE) and the nation. To address such challenges it is essential for INEEL to 1) align its discretionary research programs with objectives outlined in its *Long Range Plan*, 2) possess a core of resident technological expertise, and 3) maintain strong research-based collaborations with top talent from universities.

It is widely recognized that the primary vehicle for ensuring excellence in the research enterprise is merit-based peer evaluation. To achieve the highest technical quality research, the URC Program issues a solicitation for research proposals from faculty of accredited U.S. universities. A call for prospectuses (brief pre-proposals) is announced through the Commerce Business Daily, and interested parties are directed to an Internet web site for the full details of the solicitation. A unique feature of the URC Program is that the prospectuses are first screened by INEEL business area leaders for relevance to objectives that support the *Long Range Plan* (for example, *Site Specific Technologies for Agriculture*). Full proposals are invited from those principal investigators that address the highest priority technology needs. The full proposals are then evaluated through an external peer review coordinated by the Massachusetts Institute of Technology (MIT), utilizing the high standards associated with respected institutions such as the National Institutes of Health (NIH) and the National Science Foundation (NSF). Only those research proposals that meet the highest standards for technical merit and highest relevance priority rankings are funded. Most projects are reviewed for scopes of work to be performed over a 2-3 year period, however, funding is awarded on a yearly basis, contingent upon performance that is evaluated annually.

A good example of the way in which LMITCO achieves alignment of the URC research portfolio with the *Long Range Plan* is the program's orientation toward challenges faced by the agriculture and food processing industries. The leaders of INEEL's *Site-Specific Technologies for Agriculture* (SSTA) are in communication with a network of industry, university, and government professionals who keep them well informed of the critical technology needs of this complex industry. The LMITCO SSTA leader combines this continually growing insight with an understanding of the unique technology resources at the INEEL and develops a section of the call for proposals. The SSTA leader also evaluates research prospectuses, makes recommendations regarding invitation of full proposals, and evaluates full proposals for relevance to SSTA objectives. The SSTA leader is also part of the review panel that annually evaluates progress of each research project.

Another important way to achieve alignment of the URC portfolio with INEEL business objectives is through active research collaborations with INEEL scientists and engineers. The URC Program Office helps identify INEEL scientists and engineers who are conducting related work, and facilitates research collaborations that enhance the value of the results.

This dual approach of the URC Program, investing in highest technical quality research that is aligned with business objectives, ensures that INEEL will realize highest value for its investment in research and development, and increases the probability that high quality technical results will be utilized in a timely fashion.

United States - Israel
Binational Agricultural Research and Development Fund
קרן דו-לאומית למחקר ולפיתוח חקלאיים של ארצות הברית וישראל
BARD - קמח

STATEMENT OF DR. EDO CHALUTZ
EXECUTIVE DIRECTOR
U.S.- ISRAEL BINATIONAL AGRICULTURAL RESEARCH
AND DEVELOPMENT FUND (BARD)
BEFORE THE
SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION, AND RESEARCH
OF THE COMMITTEE ON AGRICULTURE
U.S. HOUSE OF REPRESENTATIVES
JUNE 18, 1997

Mr. Chairman, thank you for the opportunity to submit written testimony in support of the U.S. - Israel Binational Agricultural Research and Development Fund (BARD). I am Dr. Edo Chalutz, Designate Director of the BARD Program.

FUNDING HISTORY

BARD, the United States - Israel Binational Agricultural Research and Development Fund, is an independent legal entity, established in 1977 by the governments of the United States and Israel. It promotes and supports cooperative agricultural research between US and Israeli scientists in areas of mutual benefits to both countries. BARD's income derives from interest earned on a $110 million endowment contributed in equal parts by the US and Israel. Due to the erosion in the purchasing power of the US dollar since 1977, as well as the success and rising needs of BARD, additional funds were provided directly to BARD's annual budget. Additional $2.5 million was provided by the US (and by Israel) in both FY 1995 and FY 1996, and $2 million in FY 1997. The amount available to the BARD program, including the interest earned on the endowment and funds provided directly from Israel and the US, is currently

BARD - P.O.Box 6 - Bet Dagan 50250 - Israel Tel (972)-3-968-3230, Fax (972)-3-966-2506
E-mail: bmary@volcani.agri.gov.il
BARD - USDA - ARS - OIRP, Bldg. 005, BARC-West, Beltsville, MD 20705, USA Tel 301-504-5605, Fax 301-504-5298

$12 million annually. The bulk of the budget is committed to funding research with less than $0.8 million used for operation expenses. Throughout its years of existence, BARD has considered 2750 research proposals and selected 760 for financial support. The total outlay on supported projects exceeded $150 million, divided more or less equally between American and Israeli laboratories. A 10-year external review process of BARD operations has shown a high return on investment, high quality proposal evaluation procedures, and efficient operation of the Fund administration. A 20-year review is planned now.

FUNDING PROCESS

The 150-200 grant applications submitted to BARD annually, jointly by US and Israeli scientists, are evaluated by peer review for scientific competence and agricultural relevance. Separate panels in each country are then formulating their recommendation for funding to a Technical Advisory Committee, composed of five US and five Israeli senior scientists. This committee's recommendations are then presented to the Board of Directors for final decisions of funding. The review process has been praised for its integrity, its thoroughness, and its ability to select proposals most significant to US and Israeli agriculture. While many US institutions receive funding through BARD, the majority of funding goes to the Land Grant Universities and the Agricultural Research Service. The CSREES appropriation to support BARD is limited to funding of Land Grant institution grants.

ACCOMPLISHMENTS

Most of the research supported by the BARD program concentrates on issues of animal and plant health, (including studies on the pest, the pathogen and the interaction with their hosts) as well as responses of plants to environmental conditions, particularly crops grown in warm, dry climates. Many accomplishments in fundamental science have been made in these areas that will lead to the development of crop plants resistance to disease pests and hard environmental conditions, reduction in livestock diseases, and increase in livestock production.

Example of BARD Research Accomplishments:

- the discovery of a powerful antiviral substance in tobacco plants that can be used to protect tomato plants;
- the development of a vaccine against Rift Valley Fever, a debilitating disease of cattle, sheep and even humans;
- the development of a method to help pecan growers in the American Southwest deal with the damaging effect of soil salinity, which previously caused premature death and stunted growth of pecan trees as well as low yields. The new method saved the trees and returned them to full production.
- the development and use of genetic marker techniques to assist in improvement of economic traits in poultry, and resistance of plants to diseases.
- the development (including registration by the EPA) of the first ever biological control product against postharvest diseases of fruits and vegetables used as a substitute for synthetic chemical fungicides.
- the study of a robotic harvester has contributed to the development of fundamental technologies which have multitude of applications throughout agriculture.

BARD has wide US Israeli and international exposure that derives from the quality of its funded research, from its proposal evaluation process and from its accomplishments. Many thousands of agricultural scientists of the first rank have been associated with preparing and/or evaluating BARD projects. Scientists from Israel and from every state of the Union are involved, as well as from essentially every other country where there is high level of agriculture research.

Throughout the years, many individuals have become life-long friends of BARD and great supporters who have learned to appreciate the unique contribution of BARD to Agricultural Research. These individuals, who could attest to BARD success, include former Secretaries of Agriculture, Agricultural Deans, farmers, political leaders in the US, Ambassadors to Israel and Israeli Ambassadors to the US, and congressional leaders and their staff.

Mr. Chairman, at this time I'd like to conclude my remarks regarding the BARD program. Thank you.

SUBMITTED FOR THE RECORD BY MR. NIX

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AGRICULTURAL COMPLEX
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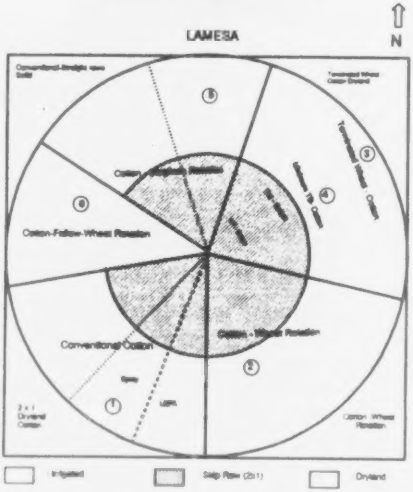
ADVANCED RESEARCH
AND
EXTENSION SYSTEMS



IN COOPERATION WITH

★ Lamesa Cotton Growers

★ Texas Agricultural Extension Service ★ Texas Agricultural Experiment Station

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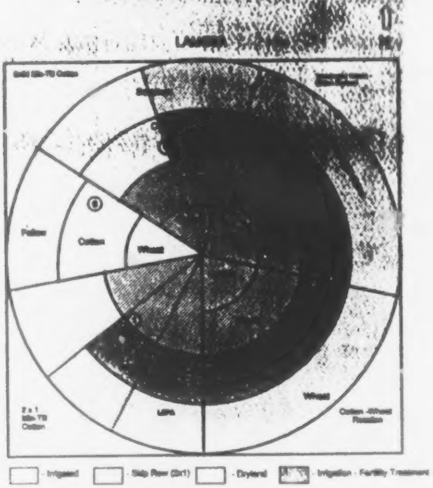

CROPPING SYSTEMS

1 - Conventional Cotton
2 - Wheat Cotton
3 - Terminated Wheat Cotton
4 - Minimum Till-Cotton
5 - Cotton-Sorghum
6 - Cotton-Fallow-Wheat

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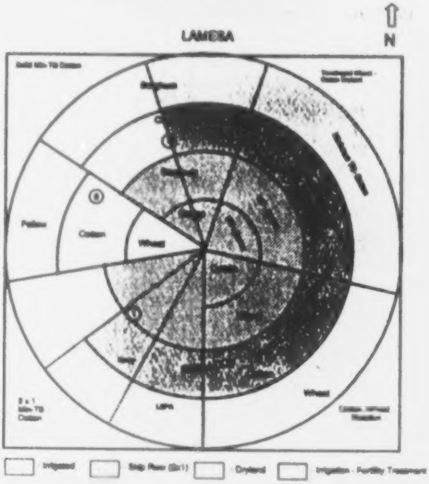

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AND

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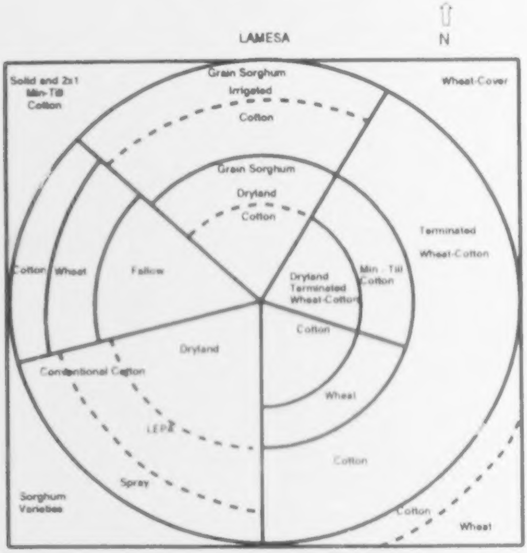

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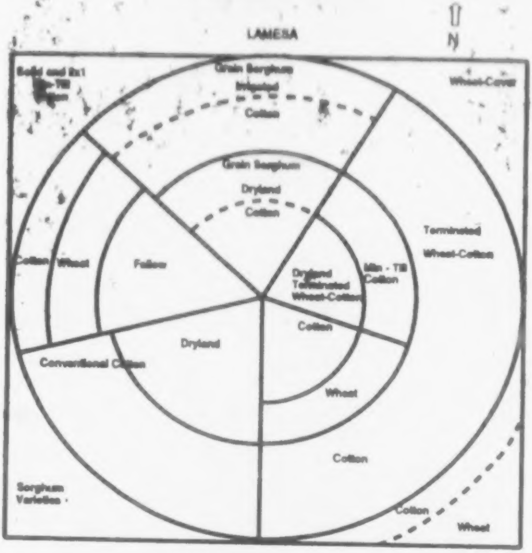

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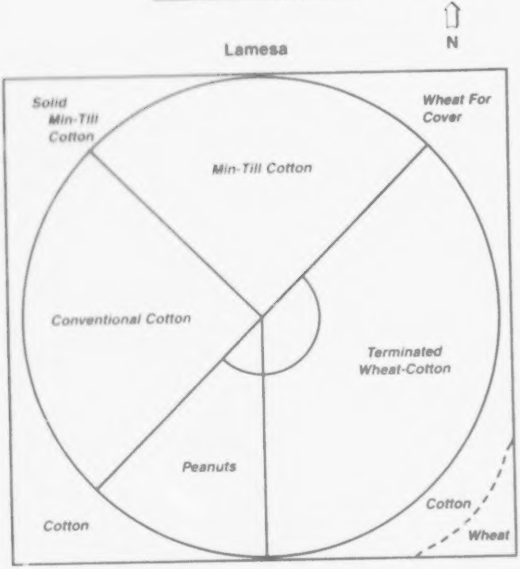

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AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION PROGRAMS

WEDNESDAY, JULY 9, 1997

House of Representatives,
Subcommittee on Forestry, Resource
Conservation, and Research,
Committee on Agriculture,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 1300, Longworth House Office Building, Hon. Larry Combest (chairman of the subcommittee) presiding.

Present: Representatives Barrett, Smith of Michigan, Everett, Lucas, Lewis, Chambliss, Emerson, Moran, Schaffer, Jenkins, Cooksey, Smith of Oregon [ex officio], Dooley, Brown, Stabenow, Peterson, Clayton, Minge, Pomeroy, Holden, Baldacci, and Goode.

Staff present: Paul Unger, majority staff director; Pete Thompson, John Goldberg, Russell Laird, Mike Neruda, Callista Bisek, assistant clerk; and Curt Mann.

OPENING STATEMENT OF HON. LARRY COMBEST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Combest. Good morning and welcome to everyone here.

I would like to thank our witnesses for the time and effort that they have taken to share their views with us on this important subject.

Today is the third in a series of four hearings we have planned by this subcommittee to review agricultural research, education, and Extension programs. We plan to conduct our hearings by discussing specific proposals for your authorization legislation at our final hearing next week.

Today we will have an in-depth discussion of agricultural education and Extension programs. We have a full list of witnesses, and a lot of very interesting individuals to hear from.

I particularly look forward to hearing from two young individuals who are currently serving in FFA and 4–H. Many of the skills we use everyday in Congress, such as parliamentary debate and public speaking, I first learned through FFA and 4–H. My first political offices I held were in FFA as district officer, and later as area president, which is similar to my congressional district today.

I could probably reminisce about those experiences all day, and I am sure that Mr. Dooley and others could as well.

Today we will hear about a couple of interesting cooperative projects to increase agricultural literacy. I could not agree more about the vital need for this most basic education of all Americans worldwide.

For those of us involved in agriculture, it is becoming all too apparent that too many people have forgotten how and why they enjoy the comfortable standard of living that they do, and take for granted that food is always at the grocery store, and clothes are always in the store.

We will continue our discussion by examining our Cooperative Extension Service. I would like to continue focusing on the theme of doing all we can to leverage public and private resources.

I am proud that the Extension Service in my home town of Lubbock, TX, uses an excellent example of this public-private partnership in their Agripartners Program. This program has received awards and recognition for outstanding contributions and performance in industry, agency, and association partnership efforts.

This project involves the contributions and cooperation of many local regional entities, ranging from the producer associations, such as Plains Cotton Growers, Texas Grains Sorghum Producers, Texas Corn Producers Association, and others, and the local seed companies and pesticide companies.

I am convinced that this type of cooperative effort is essential to remain successful as we move forward during an era of shrinking Government resources.

Again, I appreciate very much the time and effort that you have taken to appear before this subcommittee. I look forward to your testimony and your discussion, and I would recognize Mr. Dooley for any comments that he might make.

OPENING STATEMENT OF HON. CALVIN M. DOOLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. DOOLEY. Thank you Mr. Chairman, and I will be very brief.

I think that your opening statement was excellent, and I concur with all your statements in it.

I would also like to welcome some of the representatives from both the FFA Program and the 4–H Program. I, like yourself, was a real beneficiary of my involvement in that both my brother and I served as State presidents of the FFA, and my brother actually went on to become a national vice president, and so the program certainly served us well.

But I look forward to the testimony. We have a lengthy panel, so that will bring my comments to a close.

Mr. COMBEST. Thank you Mr. Dooley.

I recognize Mr. Everett for any comments he might wish to make.

OPENING STATEMENT OF HON. TERRY EVERETT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ALABAMA

Mr. EVERETT. Thank you, Mr. Chairman.

First of all, I appreciate you and the ranking member calling this meeting. I want to associate myself with your remarks.

I was a 4–H'er, and as a matter of fact, hogs were my project, and it was a great experience for me.

I would like to welcome our panel, especially Mr. Charlie Jones. Charlie is vice president of the national FFA organization and just happens to be from Billingsly, AL. The State capital of Alabama is Montgomery, and Montgomery is a suburb of Billingsly, 50 miles away.

As a national FFA Officer, Charlie represents almost a half million students preparing for careers in the agricultural industry. As everyone in this room knows, it is imperative that young men and women like Charlie stay involved in agriculture, especially in this day and time. I appreciate him taking time to share his views with us, and I have read his testimony.

I apologize for the fact, as I have told the chairman, that I have another committee meeting going on right now, and I will have to excuse myself.

Welcome, Charlie, and welcome the rest of the panel.

Thank you Mr. Chairman.

Mr. COMBEST. Thank you Mr. Everett.

Mr. Brown, do you have any opening comments?

Mr. BROWN. I hate to pass up a good opportunity, but I really do not have.

Mr. COMBEST. We will reserve that opportunity for you in the future, Mr. Brown.

Mr. Barrett.

OPENING STATEMENT OF HON. BILL BARRETT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEBRASKA

Mr. BARRETT. Thank you, Mr. Chairman.

I appreciate the opportunity to make a comment.

I welcome the panel and look forward to the discussion that will be forthcoming.

Coming from Nebraska, I understand and recognize the tremendous benefits that have been provided to rural America by our Land Grant institutions and the tradition that we have with the Cooperative Extension Service. I am glad, Mr. Chairman, that you have made this a priority of Extension and research even though there are a lot of areas in this country that are not necessarily rural.

We ought not to listen to some of the nay-sayers out there that say that there is not a place for these types of programs, because there certainly is. I am a strong supporter of the programs that are involved with agricultural Extension and education, and I strongly believe that there is a vital role for these programs in the 21st century.

So again, thank you, Mr. Chairman, and I look forward to the testimony.

Mr. COMBEST. Thank you Mr. Barrett. If there are any additional statements of Members, they may be included at this time.

The prepared statements of Chairman Smith and Mr. Barrett, Mrs. Chenoweth, and Mr. Pickering follow:]

STATEMENT OF REPRESENTATIVE ROBERT F. "BOB" SMITH
Subcommittee on Forestry, Resource Conservation, and Research
July 9, 1997

Good morning. Thank you, Mr. Chairman, for holding this hearing today on agricultural education and extension programs.

I am particularly pleased that we have with us today two such outstanding young people to talk with us about programs which are near and dear to my heart, 4H and Future Farmers of America.

I would also like to extend a personal welcome to my friend and neighbor, Dr. Shelby Price, who is the Superintendent of the Jackson Education Service District in Medford, Oregon. Dr. Price will speak about an idea he brought to my attention shortly after my re-election to Congress to promote agricultural literacy.

Anyone who has heard me speak over the last six months knows that one of my priorities for the Committee during the 105th Congress is the expansion of domestic and international markets for American agricultural commodities.

As we have seen recently in the decisions of some of our trading partners related to beef grown with hormones, or chickens sanitized in chlorinated water, an uninformed, agriculturally illiterate public can, through their irrational fears, have devastating effects on global trade.

The need for a strong commitment to Agricultural Education and Extension is as important now as it was in 1897 when the USDA Yearbook of Agriculture first proclaimed it.

I can think of no better way for Congress to facilitate this goal than to enhance agricultural education and extension programs such as the ones we will hear about today.

I believe we are all aware of the current budgetary constraints and the potential impact this may have on these vital programs. I am personally committed to maintaining adequate funds for these programs. At the same time, we must not lose sight of the opportunity that we have in the coming months for improving the efficiency and effectiveness in which agricultural education and extension programs are administered.

With that, Mr. Chairman, I thank you again for holding these hearings.

I look forward to working with all Members in crafting a Federal agricultural research, education, and extension policy that enables our nation's farmers and ranchers to compete successfully in the world marketplace.

Bill Barrett NE^{3}

STATEMENT FOR CONGRESSMAN BARRETT
REVIEW OF AGRICULTURAL EXTENSION AND EDUCATION PROGRAMS

HEARING OF THE FORESTRY, RESOURCE CONSERVATION, AND RESEARCH SUBCOMMITTEE—WEDNESDAY—JULY 9, 1997

Thank you Mr. Chairman for giving me a moment to comment on the importance of agricultural extension and education. Coming from Nebraska, I appreciate the tremendous benefits that have been provided to the citizens of rural America by our great land-grant institutions and the tradition of our Cooperative Extension Services.

Since 1862 when the land-grant university system was established, America has understood the benefits from agriculture research and subsequent extension and education of these newly discovered technologies. We have realized the importance of a stable food supply, and that the best way to protect this national asset was through education and extension. What good is it to develop new agricultural practices if the people who need to use the practices don't understand them?

The 4-H program, for example, has taught our sons and daughters many necessary life skills. From how to deliver a successful speech, to how to show lambs at the fair, to how to sew. My home county of Dawson County, Nebraska, has had one of the finest 4-H programs in the nation. Countless boys and girls have participated in this program, learning judging and reasoning skills that have proved invaluable to them as they have progressed through life.

Thank you Mr. Chairman for making agricultural education and extension a priority. Even though many areas of the country are not as rural as they once were, we should not listen totally to the "nay-sayers" that criticize these programs as "out-dated" or non-relevant to a more urban society. I am a strong supporter of the programs that are involved with agricultural extension and education. I believe strongly that there is a vital role for these programs into the 21st Century.

Statement of Representative Helen Chenoweth
Committee on Agriculture

Subcommittee on Forestry, Resource Conservation and Research
1300 Longworth House Office Building
July 9, 1997

Thank you Mr. Chairman. I would like to commend the committee for holding this hearing to discuss agriculture research relating to the agriculture extension and education programs.

Mr. Chairman, the application of research to science is a good investment, one that more than pays for itself.

I believe it is critically important for the United States to have an effective leading-edge in national food and agricultural research and in the educational system. As such, we need to support scientific, technological and economical advancements in an increasingly competitive global economy.

Additionally, we need to promote agricultural research cooperation at all levels -- federal, state and county -- and ensure that there is flexibility and innovation in agriculture research.

Mr. Chairman, in my opinion, this is best achieved by a partnership between the federal government, through the United States Department of Agriculture's research and education programs, and the land grant university system, supported by federal, state and local governments.

We must ensure that agriculture research and extension programs effectively and efficiently transfer the knowledge and technology from research scientists through the system to the producers and concerned citizens.

Mr. Chairman, we must re-affirm the importance of United States Agriculture. Also, we must allow the people to gain a greater awareness of agriculture. As such, we must remain committed to agriculture extension and the education programs.

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ASSISTANT WHIP AT LARGE
POLICY COMMITTEE

Review of Agricultural Extension and Education Programs
Material Submitted for the Record
Chip Pickering (R-MS)
Subcommittee on Forestry, Resource Conservation, and Research
July 9, 1997

Opening Statement

Thank you, Mr. Chairman for holding this hearing on agricultural research. Through the years, research in agriculture has been important to the success of America's farmers and ranchers. However, with decreased government intervention and the phase-out of many farm programs, agricultural research has become essential in order for our producers to remain competitive on the world market. In other words, while there is no doubt that our nation's farmers are the most efficient in the world, the simply fact is that they have to be in order to compete on a world market which includes many countries that heavily subsidize their producers.

I am glad Mr. Chairman, that you are allowing us to review extension and education programs during the research reauthorization process. These programs are important to our farmers, but also to our children. 4-H and FFA are two examples of programs that have been extremely important to young people throughout the years in my state of Mississippi. As a former 4-H-er myself, I believe being pulled around an arena by a heifer truly helped shape my life.

While I am a strong advocate of outreach programs that help our children, I also recognize the important role that the extension service plays in outreach programs for our agricultural producers. Money is important for agricultural research, but if the people who need the information from the research and who are able to transform research into a tangible product are unable to obtain the data and technological advancements in an efficient way, the chain is broken. I have heard discussions about the "drastic changes needed in our extension service." I agree that minor adjustments must be made to modernize our system, but that is a continuous process which should happen in any industry in order to remain competitive. But drastic change is entirely unnecessary in my opinion. Representatives of countries from around the world come to the United States to our land-grant colleges and universities to study our outreach programs utilized by the extension service. They recognize our excellent achievements in this field and believe that they should model their own country's system after ours. This is a testament to the fact that major overhaul to our extension service is simply not needed. In other words, if it ain't broke, don't fix it. I believe that lawmakers should take a step back and look at the system as a whole and realize just how efficient our system really is. Thank you again Mr. Chairman for the opportunity to make a brief opening statement and I look forward to the testimony of the witnesses before us today.

Mr. COMBEST I would like to introduce our first witness list who are at the table, and thank you very much.

Mr. Charlie Jones is the vice president of the national FFA organization. Mr. Jones is accompanied by Dr. Larry Case, national advisor of the national FFA.

Ms. Kelly Raths, former State officer and current Citizen Washington Focus Program assistant of the National 4–H Program, and she is accompanied by Dr. Myron Johnsrud. Dr. Myron Johnsrud is director of extension and outreach, the National Association of State Universities and Land Grant Colleges.

Mr. Christopher Williams is chairperson, FLP Executive Board, Project Food, Land and People.

Ms. Linda Reinhardt is chair of the American Farm Bureau Women's Committee.

Dr. Shelby Price is superintendent, Jackson Education Service District.

And Dr. Bob Robinson is the Administrator, Cooperative State Research Education and Extension Service, U.S. Department of Agriculture.

We welcome all of you today. We have a fairly lengthy witness list today, and I am sure members will have questions, and if it is all possible, we have your all of your copies of your statements. I was looking through those earlier. Some were quite lengthy, and that is fine. We want all the information we can.

In the public testimony portion, if at all possible, if you would try to hold that within 5 minutes. The light in front of you will show green until the red comes on which will be 5 minutes later, and we don't strictly adhere to that, but if at all possible it helps us in moving along.

And at this time, I would recognize the gentleman in the blue and gold jacket, Mr. Jones.

STATEMENT OF CHARLIE JONES, VICE PRESIDENT, NATIONAL FFA ORGANIZATION

Mr. JONES. Thank you Chairman Combest and distinguished subcommittee members.

I want to thank you for allowing me this opportunity to speak here today.

Right now in the United States, there are over 21 million people involved with the agricultural industry, which is 18.5 percent of our labor force. The question that I raise to myself and to other people is: How are we going to prepare educated, motivated young people to meet those needs of that changing industry in the next century?

In the next 4 years, the need for those employees and those people involved with agriculture will reach record numbers in this country, and we at the national FFA organization are involved with developing a comprehensive agricultural education delivery system.

We have nearly half a million members in 7,500 local chapter in local communities. Our national FFA membership has been rising for the last couple years. Our organization is divided into thirds where a third of our membership is in rural farm, a third in rural nonfarm, and a third in urban areas. Three of our largest chapters are in downtown Chicago, Philadelphia, and New York City.

So agriculture is changing with the changing world market.

I have had the opportunity for over 9 years now to be involved with agricultural education in the national FFA organization, and I can tell you from personal experience that the national FFA organization has taken a shy kid from rural Alabama and turned him into a leader that is going to meet the needs of this changing industry in this country.

Agricultural education has given me the direction for career success and personal growth in my life. It has provided me the opportunity to continue my education where I am currently a junior at Auburn University majoring in agricultural economics.

Agricultural education gave me the opportunity to see that agriculture is not only just production, but it also involves many facets including science, technology, and business.

My future career plans are to go on into agricultural law, to offer discount law services to farmers for their needs.

Over the past 8 months, I have had the opportunity to serve as a national FFA officer. I have looked at the list of Representatives on this panel, and I have looked at the States, and I have had the opportunity to be in every one of your States this year and speak to young people from your State and see what agriculture education and FFA has done for them.

I had the opportunity about 2 weeks ago to speak to the 1942 class reunion from Billingsly High School, the class my grandfather graduated from, and had the opportunity to sit down and talk with those individuals and hear some of the stories that they told. And to hear them talk, you would think that our country is going nowhere.

But I can honestly tell you from a year of being out in the trenches, a year of fighting the good fight for agricultural education, that for every negative story you see in the newspaper, for every negative story you see on television, I can show you 1,000 positive stories of young people involved with agricultural education and the national FFA organization making a difference in their local communities, and that is where change in this country starts, is at the local community level. Those people are out there making a difference.

Over the last couple of years, we have seen an initiative called School to Work. School to Work is a really dynamic program that gives young people the opportunity to take what they learn in the classroom and apply it to real life.

In the national FFA organization in agricultural education, we have been doing this exact same thing for over 70 years now. It is a system that is divided into three components, and those three components are: the classroom, our supervised agriculture experiences, and the FFA.

Within the classroom, we are given information by master teachers, teachers that come out and instruct us on the things in agriculture that we need to be informed on. They give us those opportunities that are out there in agriculture.

Through our SAEs, or supervised agriculture experiences, we take that information, that knowledge that they have given us, and we go out and actually apply it to the work force, and through FFA we are given the opportunity for leadership development and personal growth.

FFA makes a difference in over half a million members every year and provides this country with agricultural leaders for the future.

I want to thank you for the opportunity to be here today and to have this opportunity to speak about something that is so near and dear to my heart.

Thank you very much.

[The prepared statement of Mr. Jones appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you Mr. Jones, and thank you for your enthusiasm and optimism.

Dr. Case, did you have any comments that you wished to make?

Mr. CASE. No, I think you have heard from the one that you wanted to hear from.

I would commend a subcommittee for taking on a real challenge in this world of providing research and education programs for increasing food and fiber production, production processing and distribution to the world population that is going to exceed over 8.5 billion people. That is a challenge, and I think school-based agriculture education is contributing to a positive force in meeting that challenge.

Thank you Mr. Chairman.

Mr. COMBEST. Thank you.

Ms. Raths, please proceed.

STATEMENT OF KELLY RATHS, CITIZEN WASHINGTON FOCUS PROGRAM ASSISTANT, NATIONAL 4-H PROGRAM

Ms. RATHS. Thank you. Thank you Mr. Chairman and fellow committee members.

I am Kelly Raths, the tenured member of 4–H from Montana. I will be presenting to you today a summary of my complete testimony submitted for the record.

It is an awesome responsibility to be the spokesperson for the 50 million people who have benefitted over 4–H's 80 year history, as well as the 5.4 million youth who are involved in 4–H today.

Even before the passage of the Smith-Lever Act in 1940, 4–H existed as Tomato and Corn Clubs of the Farm and Home Demonstration Program. 4–H has been a continuous and integral part of the Cooperative Extension System ever since, operating under the Smith-Lever formula.

In the early 1900's, 4–H'ers were country kids, then the most deprived part of society. However, in the 1970's, Congress directed 4–H to reach out to meet the needs of urban kids as well, and 4–H has done so.

Today, 47 percent of 4–H's members live in rural areas, while 53 percent live in bigger towns, suburbs, and inner cities. So, once again, 4–H is meeting the needs of this part of society that needs it most.

Interestingly, the most popular 4–H project areas continue to relate to agriculture and home economics topics. Thus, 4–H is teaching city kids that there is a back door to the grocery store.

Four-H has always been a great deal more than just agricultural education, and the 4–H pledge that I have recited so many times makes this evident. "I pledge my head to clearer thinking, my heart to greater loyalty, my hands to larger service, and my health to better living."

On the whole, the racial and ethnic balance of the 4–H program is very close to that of the U.S. population.

Now, all of this is true, but we would not have 5.4 million youth voluntarily involved in 4–H if it was not fun. For me and millions of others, 4–H has redefined what fun is. I learned that it does not have to involve spending money, high tech. equipment, or challenging parental limits or the law.

Four-H comes in two forms: the aching of my laughing stomach, and the warmth of my heart after doing something that made me feel good, that benefitted not only myself, but those around me.

Now, every person is blessed with unique skills and interests, and 4–H helps youth explore these. Like going to a candy store and the reaction is the same. Young people can experiment in highly diverse areas of programming.

About 55 percent of the subject choices 4–Her's make come from biological sciences, 8 percent from the physical sciences, 23 percent from social sciences, and 14 percent from the arts and humanities.

No matter what a 4–H'er chooses to learn, they are building the assets that will yield a lifetime of rewards. While I thought I was only learning how to suture a cow, I gained invaluable experience communicating with my judges, thinking critically, managing time, and creatively thinking of ways to display what I had learned without using live specimens.

I noticed at the time, but very evident now, I also gained the assets of relating, caring, giving, marketable skills, character, and skills that help me make healthy lifestyle choices.

Four-H is the ideal example of public partnership at the Federal, State, county, and community levels. About 29 percent of Cooperative Extension funding comes from the USDA, with the balance coming from States and communities. On average, 20 percent of the total public funding for Cooperative Extension is used in the 4–H Youth Development Program.

The total Federal, State and local Government contribution to the 4–H Program comes to about $280 million annually. The national 4–H Council and similar State foundations bring in roughly $100 million.

We are thankful for the monetary support we receive, but 4–H is mostly a volunteer program. By far the largest contribution to the 4–H partnership is the volunteer leadership of 450,000 adult volunteers, and 125,000 teen volunteers.

So who are these selfless volunteers? Many volunteers are parents of members or former members. They stay involved in 4–H not only to wash watch the awesome molding of children, but because 4–H builds the family.

My parents were able through 4–H to pass down to me their heritage, values, and skills, as well as take on a few skills they never knew they had.

Four-H'ers benefit not only from their parents and other volunteers, but from the research based 4–H Programs from the Land

Grant universities and the USDA. All 4–H'ers, myself included, rely heavily upon the assistance of some 4,000 Extension agents.

Today, in addition to traditional 4–H clubs, 4–H is playing an important role in school reinvention and reform. Last year, almost 3 million youth participated in 4–H School Enrichment Programs.

I would like to conclude by telling you briefly about an exciting new 4–H Youth Voices in Action Campaign which began last fall with the National Ad Council and the national 4–H Council, Extension's private sector partner, also the Land Grant universities and counties.

This program will recruit young people to do community service. As kids see the 1–800 numbers on the advertisements, they call in and are connected with a 4–H youth from their community. This youth then connects them with the various community service opportunities.

4–H is very important to me, and I am very proud to be a beneficiary, but I would like you to please remember that I am not alone or unique in the gifts I have gained through 4–H.

In closing, one of my greatest 4–H experiences was being 1 of 10 people selected to represent agriculture in a Montana press conference with President Clinton. After introducing myself as a 4–H member, President Clinton said, "If all the youth of the United States were members of 4–H, we'd have about half the problems we do today. I firmly believe that," he said.

Well, I do too. I firmly believe that, and with myself, others like me, and even you, we can insure and see to it that 4–H touches as many youth as positively as it as it has me.

And with that, I am open to any questions that you may have.

[The prepared statement of Ms. Raths appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Ms. Raths.

I agree with the President. I think it would be much less than half the problems, and I will say to all those 4–H'ers that you are representing here today that they have had a very adequate and effective spokesperson.

Doctor, would you care to make any comments?

Mr. JOHNSRUD. No, thank you.

I just want to say thanks to the committee for selecting some emerging leaders to testify at this hearing. I think it is very appropriate.

Thank you.

Mr. COMBEST. I think we very well could see them sitting around this committee space at some point in the future. I hope they're not from Texas. [Laughter.]

Mr. COMBEST. Mr. Williams, please proceed.

STATEMENT OF CHRISTOPHER WILLIAMS, CHAIRPERSON, FLP EXECUTIVE BOARD, PROJECT FOOD, LAND & PEOPLE

Mr. WILLIAMS. Chairman Combest, members of the committee, it is a pleasure for me to represent Project Food, Land & People here this morning and bring you up to date on the brief history of our project.

I think we are kind of the new kid on the block when I look down this table this morning. I am particularly honored to be represented with these nationally recognized education programs.

We have worked very closely with the Agriculture in the Classroom program, and several of our steering committee members are either active at State or the national level with the Agriculture in the Classroom program.

We also have a Memorandum of Understanding with the FFA, and a former State director is on our steering committee. So we see the need for that close working relationship with these other organizations.

We began in 1988 in Colorado where a group came together representing agriculture, education, the environment, and natural resources; recognized that a basic concern that agriculture is affected by, and has direct impacts on, water quality and quantity, energy use, ecosystem protection, and human population.

We agreed that many of our pressing environmental problems and most promising solutions are linked to our methods of producing food and processing fiber. It is apparent, therefore, that one of our greatest challenges we face is to continue to meet the agricultural needs of people around the world in an environmentally sustainable manner.

As the challenge of finding sustainable approaches to agriculture looms, each new generation seems less aware of what is involved in meeting these challenges. In the latter part of the 20th century, as the world has become more urbanized, the majority of the citizens are alarmingly ignorant about the sources of their most basic food and clothing.

People raised in urban centers and suburbia have little direct contact with agriculture land and ways of life, and thus, know very little about where their food and fiber comes from and how it is produced, nor do they have an adequate understanding of environmental issues related to food and fiber production.

To make informed decisions as consumers and participants, young people in the United States and other nations need to know more about the interrelations between agricultural production and the issues of population, soil and water resources, energy and habitat preservation. These broad critical issues are rarely adequately addressed in traditional school curriculum, nor is there really any significant or unified movement in mainstream education to promote agricultural literacy from the pre-kindergarten through the 12th grade levels.

In 1988, we adopted a vision that said, "A future in which all people recognized the interdependence of agriculture, the environment and human needs, and work cooperatively to promote informed consumer choices and sustainable agricultural practices," a vision that all those at this table, I believe, share.

To accomplish this, we adopted a mission to provide educational resources and promote approaches to learning which help educators and students in grades pre-k through 12 to better understand the interrelationships among agriculture, environment, and people of the world.

I do not believe it was a coincidence that our meeting came about at the same time as the National Research Council's Committee on

Agricultural Education in Secondary Schools' report, "Understanding Agriculture, New Directions for Education," was released in June of 1988. They stated that agriculture is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agricultural studies.

They recommended that beginning in kindergarten and continuing through 12th grade, all students should receive some systematic instruction about agriculture, and we have accepted that challenge.

We began by conceptional framework, expanding that into a document that contains 54 lesson plans that is currently field tested in California, Connecticut, and Ohio. This fall, we hope to take the information we got from that, revise this material, and begin releasing that to educators at all of these grade levels through workshops in the various States.

Recognizing that we cannot conduct that as a national steering committee, we hope to form partnerships or affiliations in every State so that agriculturalists, conservationists, and educators in those States will come together to do the workshops and provide local materials at the same time they are doing the workshop.

To date, we have invested almost a million dollars in this project, and in my report there is a breakdown of the categories of giving and the percentage that has been invested in this to this time.

We hope that in the spring, in January, we will begin the process of releasing this. We have had 42 States involved in developing this, teachers and resource people in those States involved, and we look forward to successfully completing this in the fall and releasing it to the school systems to be integrated into their regular curriculum.

Thank you.

Mr. COMBEST. Thank you Mr. Williams.

Ms. Reinhardt.

STATEMENT OF LINDA REINHARDT, CHAIR, AMERICAN FARM BUREAU WOMEN'S COMMITTEE

Ms. REINHARDT. Thank you Mr. Chairman.

My name is Linda Reinhardt, and I come from the State of Kansas, the southeast part of Kansas, and I am pleased to see Representative Moran here from my home State.

I feel very comfortable sitting with this group this morning because as an FFA mom, I have practiced the opening and closing ceremonies many times, and as a 4-H'er and a 4-H mother and grandmother, I felt like I should stand and say the 4-H pledge with you this morning.

I do serve as chair of the American Farm Bureau Federation's Women's Committee, and I served on the American Farm Bureau Federation Board of Directors. I am here today to speak on behalf of a very tremendously successful educational program which is called Agriculture in the Classroom.

Agriculture in the Classroom is a systematic program of instruction. The goal of the program is to teach children about the importance of production agriculture. It is important that these children know where their food comes from, where the clothes come from that they wear on their back, and what it takes to make this finished product.

This program reaches children from kindergarten through the 12th grade.

Now, Agriculture in the Classroom began in 1981 from an idea discussed at a conference sponsored by the U.S. Department of Agriculture, and as chair of the Kansas Farm Bureau Women's Committee at that time, I well remember meeting with farm organizations and educators talking about how we could develop an Agriculture in the Classroom Program.

As America became more urbanized and the number of producing farmers and ranchers continued to shrink, and I believe that you spoke of this, Mr. Chairman, this morning, it soon became apparent that there was an entire generation of children out there who had little idea of where their food and fiber was produced.

Agriculture was and is a vital part of our existence; yet increasingly little was being learned about it. Agriculture in the Classroom was developed to fill this critical educational void.

Now, Agriculture in the Classroom is not a federally operated program. The program was designed to be run by individual States for incorporation into their own school curriculum.

The USDA's role is one of a clearinghouse for information and ideas developed by the States for their programs and also to provide resources and other materials to assist the States in developing accurate and complete curricula.

As I leave Washington, DC., today, I am headed to New Hampshire to attend the national Agriculture in the Classroom Conference, where educators and volunteers are gathering to share ideas to strengthen this program.

Kansas thinks enough of it's national Agriculture in the Classroom Conference that this year, we have sent an outstanding teacher that has been selected from the State to attend this conference.

While Agriculture in the Classroom has enjoyed the support of organizations like Farm Bureau, it has retained its own autonomy and identity, which I think is a very important point.

We consider it, as I say, very important that public education materials not be tied to any private trade organization or interest group, and we have strived over the years to maintain our support for the program, yet make sure that this program retains it's independence. This factor has contributed substantially to the success of the program over the years.

Agriculture in the Classroom is in all 50 States, plus Puerto Rico. Teachers who have used the program have been very enthusiastic about this. We have had excellent feedback on the continued need for the program in our schools.

The program is not limited just to textbooks. Many districts have come up with very innovative ideas to provide hands-on learning for the urban students, such as the State of Colorado. They have children that go out to the farms and ranches and work.

The overwhelming success of Agriculture in the Classroom has cost the American taxpayer very little. The USDA part of the program has operated on a limited budget of $200,000 per year. This amount is almost insignificant when compared to operating budgets of educational programs of other agencies.

USDA coordination and technical assistance is a vital part of the program. Moreover, Agriculture in the Classroom has never been authorized by Congress. Instead, it has to rely on a discretion of the Secretary of Agriculture for its funding and vital presence with the USDA.

And I suppose the most important thing that I want to say today is this status has cast a cloud of uncertainty over the continued existence of the program because there is no guarantee that the program will be continued within the department from one year to the next.

We ask you to insure the continued support of USDA as an important resource and clearinghouse component of the program. In order to maintain it's level of success and insure the continuity of the program, we request:

(1) Agriculture in the Classroom be authorized by Congress in the same form and structure as it has operated since it's inception; and

(2) Agriculture in the Classroom be funded at a sufficient level to maintain its high program standards, and commensurate with its high level of success within our schools.

I thank you for allowing me to be here today, and speak to you about this very educational program, and certainly I would welcome any questions.

Thank you.

[The prepared statement of Ms. Reinhardt appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Ms. Reinhardt.

The Chair will recognize our colleague from Oregon, the chairman of the Agriculture Committee, for an introduction.

OPENING STATEMENT OF HON. ROBERT F. (BOB) SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

The CHAIRMAN. I thank the chair very much, and thank you for holding these hearings. I am impressed by the number of people who are interested in agricultural education, and it is a fair question, I think.

Where does the initiative come from? Does it come from the Federal Government, or does it come from the grassroots? And to discuss that with you for a moment, it is my privilege to introduce Dr. Shelby Price, who is from the State of Oregon. He is the County Superintendent, still serving.

You know, county superintendents have a life of about the average of a machine gunner in the Second World War, but Dr. Price has survived because of his intelligence and his ability, and we are delighted to have him here. He is going to talk to you about a program that he suggested to me almost a year ago that I think has tremendous merit. It might come from the other side of the situation, from the grassroots side, but I think it has great merit, Mr. Chairman. I am delighted that you allowed him to testify.

Thank you so much.

Mr. COMBEST. Thank you, Mr. Chairman.

Dr. Price.

STATEMENT OF SHELBY PRICE, SUPERINTENDENT, JACKSON EDUCATION SERVICE DISTRICT

Mr. PRICE. Good morning, sir.

Mr. Smith, it is a pleasure to say good morning to an Oregonian today. I might say to you and to the committee I like it here. It is the first time I remember as Superintendent of Schools sitting in a large table and I only sit among friends. [Laughter.]

Mr. PRICE. Thank you for the fine testimony of the young man from Alabama, the young lady representing 4–H. I have very little to say after following these people.

As Superintendent of Schools, dealing with watching agriculture teachers, the agriculture teachers, and I have been in the business 40 years, and agriculture teachers have always demonstrated incredible ability to teach, to relate to kids, relate to families, relate to schools, relate to other teachers, and they have always been an impression.

I have tried to figure this out for about 15 or 20 years, and what makes the difference and what makes them so good, I think it has to do with relating with kids in the classroom with their academic sense. It has to do with the activities and it has of getting to know the kids as members of their own families, and that makes a difference in the whole process of teaching and learning.

In today's world, we are talking about very few kids who are following their grandmas and grandpas around the farms learning about the family farm. They figure the milk comes out of the large container down at the Safeway store, and thus, we became considered with literacy in agriculture, and what we are doing is proposing that schools have a particular emphasis of agriculture education at grade 6 or grade 7.

We have been working on it. When I work on curriculum in this sense, we go out to the Extension Service, the Experiment Station, and we bring in all of the agriculture teachers, and we sit down with some 6 grade teachers, and we develop some plans.

So far we have not found any one of particular interest of the principals and the sixth grade teachers, and I guess to serve as Superintendent of Schools in an area of about 11,000 square miles, 51,000 kids, and 110 separate buildings, and the interest in agriculture literacy as we are proposing it is enormous.

We propose to be infusing agriculture for a 6 to 9 week session in grades 6 or 7, depending upon the school district's structural organization, to talk about agriculture in math, science, social science, and the agriculture content goes beautifully with State and national subject matter standards for education improvement or for reform, for career awareness. We have heard the table about, you know, nearly one worker in five is agriculture employed whether they know it or not.

It has to do with school to work, with exploration of jobs, and we are proposing that the agriculture teachers have a different role than they have had before, and they become mentors for the teachers of the grade 6 or grade 7, and the agriculture teachers I have talked to are enthusiastic about it, and their principals are enthusiastic to have them do it, for them to be the professional development leaders of these teachers, to provide them with contemporary data to put into the curriculum.

We are also talking about this curriculum being distance learning, technology driven, and not to be a paper curriculum.

We have a television station in our district that covers this region that we have. More and more things are happening at the encouragement of the Federal Government with technology, and I am saying let us put together a curriculum like this and use the technology and not go back to a paper curriculum.

We think that the existing educational system is economical and efficient, and it is ideally suited to take a look at the social and the economic and the political issues of agriculture in our society and to use that as an understanding point for teaching of other things.

This curriculum is not very brilliant. I think it is just plain common sense. Teachers are going to request to use it. We do not impose that on any school district or would not impose it on any teacher, but it is going to be so good, and it is going to use technology, that they are going to want to use it.

The curriculum itself is going to be dealing with political awareness, the social issues having to do with immigrant labor, Federal inspections, endangered species, public lands, water issues, food safety.

I happened to notice in the Washington Post newspaper yesterday there were two articles talking about importing of berries and the importing of vegetables from countries where we recommend our citizens when traveling there do not drink the water, and then we wonder why we may have a problem when we receive their products.

We also had an interesting article in yesterday's paper about farmer's markets in Washington, DC., and how popular they are and how good they are for the farmer, how good they are for the people to shake hands with the people that grow the food they are going to take home and eat that evening.

What we are talking about in the schools and changing curriculum would not be involved in environmental issues. There is no sense having a battleground for that.

Schools under this notion are not going to be asked to add teachers, no adding of classes, no new equipment. We will simply use what it is we have and have a slight redirection of some things. We want to rethink, restructure, apply technology, and implement it with the agriculture teachers being the professional development specialists to make it happen.

Already we have a considerable investment from Oregon, from Texas dealing with this concept and the agriculture teachers are working with us and working with sixth grade teachers to make some things happen.

So they strongly support the idea, and it is going to be discussed at the FFA convention in Kansas City this fall.

With that, I am very please and very proud to be working with these people to do something new and different, and I thank you very much for the opportunity to come and say good morning to you and to share some basic thoughts about this.

[The prepared statement of Mr. Price appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Dr. Price.
Dr. Robinson

STATEMENT OF BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. ROBINSON. Thank you, Mr. Chairman.

I am certainly pleased and honored to be here today among both the current and future leaders of this country.

It is, indeed, gratifying to be the Administrator of the agency in USDA that is the Federal partner with State and local government for the delivery of 4–H programs, and the representation today has been outstanding.

We also partner and collaborate with the FFA programs. So we are pleased to do that.

It is also quite an honor, and I am very proud to report, that I, too, have been a member of both 4–H and FFA and served as the State president of the North Carolina Association of FFA at one time.

Having said that and feeling that I am in good company, I am left with the remark that Mr. Price made before you turned to me, Mr. Chairman, and that is perhaps there is little left to say, but as a representative of USDA I could at least take the opportunity to underscore some of the points that have been made by my colleagues at the table.

In my testimony before this group several weeks ago, I focused on one of the principles that USDA is using to look at reauthorization of title 8 of the farm bill. Today perhaps I could turn to two additional points.

The first is the goal of the Department of Agriculture and the Research, Education, and Economics Agencies to invest in creating and strengthening the research and educational capacity essential to meeting national goals for food and agricultural systems, and to produce students such as those you see here today.

Second, the programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.

American agriculture is being challenged as never before to develop new technologies and use them, to expand industrial uses of agricultural materials, and to operate in a way that is both internationally competitive and environmentally sensitive.

At the same time, the quality of life in the United States is being challenged by threats to health, economic well-being and family stability. Our success, Mr. Chairman, in maintaining world leadership in agriculture and in providing our population with the best possible quality of life depends on a critical mass of highly trained and creative scientists and professionals dedicated to solving current and future problems.

USDA's higher education programs are an investment in maintaining world leadership and in that excellence. While the States are primarily responsible for educating young people, USDA works closely in cooperation with higher education institutions to identify critical and emerging issues and to establish national priorities to promote public and private partnership ventures for promoting excellence in education.

We accomplish this through the National Agricultural Research, Extension and Teaching Policy Act of 1977, which gives broad latitude to develop these programs. When that act was passed, it was recognized that we had declining enrollments; we had a maturing faculty with a shortage of new professors coming in; and we had a need to increase significantly the science base in our Land Grant colleges and universities.

In 1977, the student population in almost every college lacked diversity. Although women were starting to enroll in greater numbers, the agricultural disciplines were failing to attract a proportionate share of the most talented students.

Because of outstanding flexibility in that Act, through the focus on programs and policies, we have been able to address many of these issues. We still have a shortage of students at the Ph.D. level, but we no longer face shortages of undergraduates, and our undergraduates have very successful placement rates.

We have strong programs, and we are effectively training the next generation of faculty and scientists.

A Washington Post article this past weekend pointed out the adaptability of the Land Grant university system and other colleges of agriculture to be able to adapt to changing conditions. The article pointed out that the system has adjusted, enrollment is increasing, the science is improving, and the frontiers are being pushed.

We are pleased that the programs administered by the Department of Agriculture contribute to that. We have programs that deal with helping institutions improve their capacity. The national Needs Graduate Fellowship Program is targeted to recruit and train pre-doctoral students. We have a Higher Education Challenge Grants Program and an 1890 Institution Capacity Building Program.

We also have a Multi-Cultural Scholars Program to increase the diversity in our Land Grant universities and other partnerships, and an endowment fund and Education Equity Grants Program for 1994 Land Grant institutions.

The most recent program is the Hispanic Serving Institutions Educational Grants Program, which was begun in 1997 and was authorized by the Fair Act of 1996. We have operated very close with HACU, the Hispanic Association of Colleges and Universities, to design that program to achieve the maximum benefit, to improve the capacity of those colleges and universities.

Mr. Chairman, we also work closely with the programs that have been discussed in AgrAbility and with programs in Agriculture in the Classroom as a facilitator of that program with States. We are very proud to be a part of this educational system. We feel that it has done a great deal, and we feel that the continuing involvement of the Federal partner can continue to make improvements as we partner with State and local governments to improve education throughout our system for the benefit of the future.

I look forward to questions, Mr. Chairman, and to following this session to talking about Extension in your next panel.

[The prepared statement of Mr. Robinson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Robinson.

Mr. Chairman, did you have questions of the panel?

The CHAIRMAN. I thank the gentleman very much and the patience of the committee.

Dr. Price, I am intrigued with the idea that a program presented to this body does not cost any money, does not cost any more teachers, and merely realigns curriculum. That is intriguing. That has not happened here in quite some time. Thank you.

But I am intrigued, as well, with how you expect this to work throughout the country, recognizing that curriculum is directed by local communities and the selection for what is taught in the sixth and seventh grade is done by local education interested people.

How do you expect this program of yours to expand across the country?

Mr. PRICE. Well, we have got a good partner with those folks in Texas. They are good thinkers.

Mr. SMITH OF OREGON. Questionable, but—— [Laughter.]

Mr. PRICE. And so we are dealing with that, and we are thinking about it. You know, as they are dealing with sixth grade teachers and we are, too, we are not finding anybody that is opposed to this idea, but what has to be done is to take the curriculum, to get it really squared away, and to put it to technology so that kids in Kentucky would be talking with kids in Texas, and their instructors are using technology.

We are talking about things the Federal Government has already put as a high priority to do some reform in education, to do some new and different things. It is easy to do new things that cost a lot more money. I think what we are doing about the cost, it is going to cost some money to do this, but it will not cost anything for the schools to deliver it.

Once we get the curriculum put into a technology, we are absolutely convinced that there are enough professional people in the business and outside of the business who will be developing this curriculum that companies will be wanting to put it together so that there would be a payback for any cost of curriculum development that there will be.

The CHAIRMAN. Well, I assume, Dr. Price that the direction that you are taking here is you assume, as I do, that everybody in this room understands where food comes from, but the problem is, and we face it every day here with representing various commodities in America, that people from the city do not understand where food comes from.

So if we can direct educational processes to sixth and seventh grade, there will be a lot more appreciation of where food comes from and, therefore, much more appreciation of agriculture. I assume that is your direction.

Mr. PRICE. Well, I guess part of it, too, is the human nature. If you figure a way to provide something to anyone that requires less work or redirected work rather than more work, there is going to be interest in it, and if we develop this material good enough, of high enough quality, with the enthusiasm of our agriculture teachers, I think that we are going to be able to provide a tremendous amount of material in a new way, an exciting way for teachers, well as kids and their parents, that they are going to be clamoring for this material, but as we have looked at it, that is how it looks to us.

Mr. COMBEST. Thank you, Mr. Chairman.

Mr. Dooley.

Mr. DOOLEY. I just have one really brief question, and it would go to Mr. Jones.

You said that the FFA program has seen a growth in membership over the past 2 years. What would you attribute that to?

Mr. JONES. I would attribute that to the development of new programs. We spoke about agriculture education teachers. The move into the urban areas has been a major area of growth for our organization, moving into those areas and showing those people that not only is it just production agriculture, but there are so many other facets of agricultural education, as well, and I would attribute that to being the biggest area of growth in the last couple of years, is those urban programs that we have developed all across this country.

Mr. DOOLEY. So, in essence, you would attribute the growth then to the ability of your organization to make itself more relevant to an urban population?

Mr. JONES. Yes, sir, to meet the needs of a changing world and a changing industry, we have had that visioning, and we have had that vision to see those things through and to meet those needs of that changing industry.

Mr. DOOLEY. Thank you.

Mr. JONES. Thank you, Mr. Dooley.

Dr. Price mentioned the national FFA Convention, and Mr. Jones had mentioned in his comments about how agriculture is changing, and you have not had to be around agriculture for long to recognize the changes that are occurring in it, but it reminds me of a story when I first came to Congress in the mid-eighties I was asked to address the State Presidents Association that happened to be in town, and I noticed a lot of women in the group. That was a substantial change from when I was in FFA when there were no women at all. I would say it is a very good change, as well.

But I was telling them one of the highlights of my life that had been when I was a freshman in high school nearly 40 years ago I went to the national FFA Convention in Kansas City, and we boarded a train in Amarillo, TX, at 7 at night and arrived at Kansas City the next morning about 8, and it was a long night sitting up on the train.

A few years later when I was Area President of FFA, I received what is known down there as the Santa Fe Award, and that included a trip on the train, except in this trip I had a berth on the train, and I told that and no one made any obvious recognition, and I said, "Do any of you know what a berth on the train is?"

And they did not, and of course, that obviously took a great deal away from the story. [Laughter.]

Mr. COMBEST. I had to explain to them that they knew what a birth was, but not on a train, and none of them rode trains. They all flew, and I had to explain to them, of course, that I had a sleeper car, and I still do not know that it made a great deal of impact, but it made a great deal of impact on me back in the late fifties and early sixties.

You come from a variety of backgrounds and I will say a variety of generations here in the hearing panel today, and yet there is obviously a common thread that binds you all here, and I am extremely pleased to hear the efforts of coordination among various groups and interests, all trying to reach the same goal, and yet I detect, and I feel that there is a lack of coordination in some people's minds.

And my question to you, each of you, if you could all make a brief comment is: what things can be done better to pull together coordination between various interests with the same goal that is not being done today? And what suggestions would you have of how that might be achieved?

We will start with you, Mr. Jones, and go down the table.

Mr. JONES. I think activities such as this, an opportunity to get together, an opportunity to come together in one place and talk about these issues and come to an understanding how each of the organizations view certain things so that we could come to a common purpose, a common goal.

Ms. RATHS. Playing off of a lot of similar communication and things like that, I feel that there is a lot of connection. As she said, she is a 4–H mom and an FFA mom, and there is a lot of connection in our goals and purposes, but communicating that, I guess, is what we need to do more of, and so in summary of that, just recognizing like opportunities like this and being able to get out into our local communities and identifying who in our communities is working on the similar aspects that we are.

So personally, within our problems, is how it would best be achieved through my point of view.

Mr. WILLIAMS. I was at the Agriculture in the Classroom National Conference the last 2 days, and on Tuesday we actually had a meeting where representatives from FFA, 4–H, Agriculture in the Classroom, Foodland and People, and the Farm Foundation, and the Agriculture Council of America came together and were talking about this very issue, and one of our goals is to produce a brochure summarizing the different programs that each of us has so that we can see how they network together, how they come together, and are not duplicatory.

Second, we are proposing to hold a summit. That summit would be the program people, as well as the industry people, because we feel that industry is a primary financier of this type of thing, and we would like to bring them all together and begin sharing and having a planned program with some goal setting so that we come out of that summit with some common objectives and some direction and begin prioritizing our investment.

Ms. REINHARDT. Well, Mr. Chairman, I feel that the Agriculture in the Classroom Program is really doing quite a good job of this. I happen to have with me an Agriculture in the Classroom note, a little newsletter that goes out to the States, and it lists the contacts throughout the States, and as I go through this list of contacts, I see that it is not any certain organization or any certain group. It may be the State Board of Agriculture; it may be universities; it may be organizations, such as Farm Bureau.

So I really feel that we are doing quite a good job coordinating this within our States, and certainly that is the reason we need Agriculture in the Classroom in the USDA, to help us coordinate, to be there to give us leadership, to be there to be the clearinghouse.

So as I say, I feel like a pretty good job is being done with the Agriculture in the Classroom program.

Mr. **PRICE**. I would like to turn the question to the local level because that is where I can make something happen and will. As we get into this, we are going to have a meeting with every single curriculum director of the school districts in our region and, at the same time, with our agriculture teacher leadership, with the superintendents. We are going to sit down with them, the principals, the curriculum directors who are all coordinating and working together.

Mr. **ROBINSON**. Thank you, Mr. Chairman.

Just to add to what my colleagues have already mentioned, the bottom line is communication, communication, communication, and I once again applaud you for having this kind of panel before this committee to look at the different aspects of education.

Our agency is working to bring together the complementary aspects and the partnership between youth programs, 4-H and FFA.

Additionally, we continue to work, and as pointed out by Ms. Reinhardt, in a coordination role that will allow us to bring different parts of the system together perhaps in better coordination to achieve the education goals.

Mr. **JONES**. Thank you all.

Mr. Williams, I think the committee would be very happy as you begin through the summit work-up, a pamphlet or work up information, anything of that that you would feel comfortable sharing with the committee, I think we would be very pleased to have.

And as was indicated, all of your statements will be made a part of the record in full, and if there are other documents or bits of information you would wish to share with us, we would be very happy to receive those, as well.

Mr. Brown.

Mr. **BROWN**. Thank you very much, Mr. Chairman.

First, let me just recount an anecdote from my early days on this committee when I was not sure what agricultural education was and I wanted to do a little experiment. The Department of Agriculture was offering packets of free seeds for Congressmen to distribute at that time. So I sent out a notice offering to provide free seeds to anyone who would like to start a garden, and the free seeds included directions as to how to start a garden, and we assumed that young people would take an interest in it.

I did not realize how big an interest until I started counting the returns. I ended up sending out about 15,000 packets of free seeds to students, to schools, and to other people in my district, and 25 years later I am still getting people who come to me and thank me for those free seeds or maybe their kids thank me for those free seeds that we sent out that helped them get started in gardening.

It is still something that attracts an awful lot of interest, and it is very educational for children particularly to get involved in it.

I want to just ask one question of Dr. Price. You know, we are operating under new rules in the Congress this year which require witnesses to provide information as to whether you are receiving any Federal grants or contracts, and you had an extensive list of Federal funds that you receive in your system, Dr. Price.

Does this requirement, in your opinion, provide useful information to the committee or is it an exercise in additionally burdening witnesses with the requirements to provide non-essential information? Was this a burden to you, Dr. Price, and do you think that the knowledge that you received funding in your particular school district is relevant to your testimony?

Mr. **PRICE**. Particular funding?

Mr. **BROWN**. Of course, I assume that you always grant the Congress great wisdom in making requirements of this sort. I am asking you to probe into how great that wisdom was.

Mr. **PRICE**. I must say to you in all honesty it was not a great burden to me. I did it with a phone call yesterday to the business manager. So it could have been a burden to him. [Laughter.]

I do not mind answering the question. If we receive money, I will be accountable for it, and so we did that. I do not think that it had a single bit of bearing or that those kinds of funds have any bearing at all on our topic today.

Mr. **BROWN**. Yes. Thank you very much. I appreciate that.

I have no further questions.

Mr. **COMBEST**. I will be sure to bring the gentleman from California some of my home grown tomatoes. I picked my first two yesterday.

Mr. Barrett.

Mr. **BARRETT**. Thank you, Mr. Chairman.

Just an observation, I guess, initially about the testimony from the two 4-H representatives. I thought it was outstanding.

We are telling little stories, I guess, to kick things off. I recall the first time I had an opportunity to visit with a 4-H group here in Washington, as we all do. In fact, I think some of us are meeting with some of your people yet this afternoon, but standing out on the East Plaza and looking up the Senate steps at that sea of blue jackets and those shining faces and those bright eyes was an experience that I will not soon forget.

I think probably that it would be safe to say that we could recognize 4-H'ers on Capitol Hill even without the blue jackets by two things: the way you dress and your deportment, the way you act, and I congratulate you for both and for the testimony this morning. I thought it was exceptional.

Dr. Price, you zeroed in on sixth and seventh grades. Any particular reason? Why not fourth and fifth? Why not eleventh and twelfth?

Mr. **PRICE**. As we took the idea and sat down with the agriculture folks and we sat down with the groups of teachers, that was just the common attitude of the educators that we talked to in our area, and as we talked to in Texas, that it made sense to go for.

Mr. **BARRETT**. The consensus of the educators. Fair enough.

Ms. Reinhardt, you talked about the fact that your Agriculture in the Classroom has been so successful, and yet you are operating on a limited budget of I think you said $200,000 in your testimony, and I am assuming from the testimony that this is not specifically authorized or appropriated. You are really operating at the pleasure of the Secretary of Agriculture. Is that fair?

Ms. REINHARDT. That is correct. We are, and that $200,000 is a very limited budget, but the reason we are successful, I believe, is because we have an army of volunteers out there in our States who are willing to give their service and their time for this very important program.

So this $200,000 I am sure goes for like this Agriculture in the Classroom notes, a newspaper that goes out, the conference that is being held now in New Hampshire, and for resources.

So I think that we are doing a tremendous job for no more money than has been put into the project. But certainly the uncertainty of the program I think is the problem more than anything else, is we just want to know from year to year that it is going to be there and would like to have it be authorized by Congress.

What would happen if we had a Secretary of Agriculture—I do not think that would ever happen—that was not in support of the Agriculture in the Classroom program? It would probably go out the window. So, certainly, we would like to see it be authorized by Congress.

Mr. BARRETT. I do not think there is any question about the fact that you are not doing a good job. Perhaps the obvious question then to Dr. Robinson is under whose authority? How is this done? How does it continue to be done? Should some changes be made?

Mr. ROBINSON. Mr. Barrett, the program, as Ms. Reinhardt points out, is not in the authorization language. It is in the report language in the Appropriations Act.

Mr. BARRETT. I see.

Mr. ROBINSON. It is under Federal Administration which is a category in one of our line items in the CSREES Extension Activities account that contains a number of different activities.

The program that Ms. Reinhardt spoke of is something that is a tremendous leveraging program for a small amount of money and providing coordination and resources with States and with local school districts.

Additionally, it provides an education source for students that they otherwise would not be able to obtain. As a result of that, the department has recently decided to institutionalize that program within our structure, and the Secretary has transferred that program to my agency, and we are currently recruiting for a permanent national program leader to serve as director of that program.

Mr. BARRETT. Is it fair to assume, then, that Mr. Williams' program and Ms. Reinhardt's program are handled essentially that same way in terms of the dollars by the Secretary?

Mr. ROBINSON. The program that Ms. Reinhardt spoke of is a program for which funds are specifically appropriated and the other program is not.

Mr. BARRETT. OK. Thank you very much.

Thank you Mr. Chairman.

Mr. COMBEST. Mrs. Clayton.

Mrs. CLAYTON. Thank you.

I guess all of us have relations of 4-H'ers, and so I do not have a story, but I, too, am a mother of four 4-H'ers who are all adults.

I am impressed with the 4–H program and have always been, so it I am not a new convert. But I do have concerns about 4–H programs and a little bit about the FFA program, not because it is not ideal. It is because I do not know the value of it. It is not penetrating, in my judgment, in my district as effectively as I think it could be.

And I guess I would just want you to think about how these marvelous missions and objectives that you have talked about and written about, how do we penetrate them?

I want to tell you I know 4–H, and I was honored to be the 4–H representative in Congress, served in the 4–H Foundation, worked with it.

Of course, I am a strong supporter of 4–H, and because I am, I am aware of the difference between the potential and the reality. And I just wanted to know, both from the FFA—for instance, I will give you an example.

You said there is an increase, and it is an increase because the marketing has moved more urban. I have no objection to that. I am appreciative of that. But I also know there is less of a recruitment in many of our rural counties. I do not know if it is because young people are shying away from that which they come from. I do not know that.

In 4–H where we would send, say, 100 kids to camp or we would have regular programs after school 3 times a week, we are sending 10 kids, 15 kids to camp and having only 2 programs the whole week. I have seen this, so I have started documenting this.

So I am wanting to know your experience with success. How can you help me to know what we can make happen in our room?

And, second, in terms of your program, Dr. Price, I am really impressed with that. I want to tell you I want to talk to you later about that. I will have someone call you and try to model a program after that.

And I do know about your Agriculture in the Classroom, because Farm Bureau and I worked together on that. I know the young man who heads it up in North Carolina. So I have been engaged in this in a very personal way. It is not just coming here.

I am struck by what is ideal and the potential, with a sense of anxiousness how I make that the reality for so many young people in our community, and how youth development can be a deterrent for behavior that is not productive.

You know, I am losing those kids in the summer. I am losing those involvement of parents.

I see you talking about the volunteer. Help me understand what I can tell my young people in my communities. I have 28 counties. Now all of them are not that dismal, I can assure you, but I can tell you I have seen them at their peak.

My brother-in-law was director of the Extension Programs. He is right now a retired person, doing a curriculum just as Dr. Jackson is doing. Rather than agriculture, he is taking agriculture and science, making science teach kids science and math. He got a curriculum to develop that. He got a foundation to do it.

But help me understand how we can really revitalize this at the local level.

Ms. RATHS. I think you touched on it. There is no question that when 4–H gets into somebody's family, gets that youth no matter what their range of involvement is, the skills that they acquire are awesome, and I am sure as you have witnessed.

But 4–H, as I mentioned in my testimony, we are so reliant upon volunteers and parental involvement, and that is one thing that not only, like in just general trends of loss of that involvement in public schools and things like that, but the 4–H program needs those volunteers, that strong volunteer base.

And 4–H is working right now on a lot of how to educate those volunteers and to get those volunteers involved and there is a lot of material available.

And so to have a strong 4–H program, we are relying upon volunteers, and I would encourage you maybe to research into some of that. There is one that I can think of off the top of my head that is the taxi program. How to recruit your volunteers, because when you get your volunteers, then that is the sole basis for changing and molding those youth because it is such a powerful program, but we need the volunteers.

And so maybe looking into some of those things that we have really worked hard to research on, how to keep and maintain volunteers in communities.

Mr. JONES. Yes ma'am. I had the opportunity this year to spend the week at Watt Lake, NC, there at the FFA camp. I have been to FFA camp at Southern Michigan, training State officers in Maine, all over this great country and in Nebraska with those young people there.

And I can tell you that the one thing that I have seen is that we have to equip our agriculture education teachers, our State officers, our individuals who are in charge of those programs with the necessary tools that they need.

That means that we have to give them support in whatever they do so that they can go out and they can motivate those young people to do those type of things. Because if they can motivate them so that they know, and that they can see through the programs that the FFA and 4–H both offer that we provide those opportunities for that entrepreneurship, that time for the diversity if agriscience in those rural areas.

Coming from a rural area myself, I know when I first started off in agriculture education, it was basically a shop class. But by the time I finished, my teacher had been motivated by people to change the way he taught, and so he went into the agriscience, he went into the biotechnology, he went into the career choices, and those things motivated me, and it also motivated over half my high school to join agriculture education and FFA, and that is the thing that we have to do.

We have to make sure that we, as individuals and as leaders of our States and as our local communities, go out and give that motivation to those people so that they can go and do their jobs to the best of their ability.

And what they do with that is they go out and they motivate those young people. We provide those leaders and those examples, because that is where people are going to get involved. That is where those seventh, eighth, and ninth graders are going to get involved with these programs, is when the twelfth graders and when those eleventh graders are motivated, when they are dedicated, when they have had that proper instruction.

Then they come back and motivate those young people to join and get involved and reach that career success with both of these two programs with 4-H and FFA.

Mr. COMBEST. Mr. Moran.

Mr. MORAN. Thank you, Mr. Chairman.

Several of the questions I was interested in have been asked by other members of the committee. I am curious to know if there is any evidence that there is a greater level of knowledge of agriculture, how food is put on the table, in rural communities versus urban areas, and if the programs that you all have talked about, particularly Agriculture in the Classroom, are being utilized in a broad way across country, urban, rural, communities and States that we do not traditionally or historically think of as agriculturally oriented.

Are we getting agriculture education at least to the places that I, in a stereotypical way, would think it ought to be going, or is that stereotype wrong, and it is us folks from rural America who need to know about agriculture?

Ms. REINHARDT. May I answer that?

Absolutely, we are getting Agriculture in the Classroom to the cities, the downtown New York and the Washington, DC., and I am sure at this conference that we will be going back to, and I will be going, we are going to see educators there from those areas.

So we definitely are reaching both the rural and the urban, and I think that the point that you are talking about about the rural kids is interesting because we just assume that everyone who lives in a rural area knows about agriculture, and we have found out that that is not true because, for instance, I really don't know much about raising rice or cotton, coming from southeast Kansas.

And so we need to have a broad base education from State to State, but the question of reaching the kids in the city, yes, we are doing that.

Mr. MORAN. Good. I appreciate knowing that.

Is there any objective way to test the success, the level of knowledge increasing in this country on agricultural issues?

Do we have any concrete evidence that Agriculture in the Classroom is working?

Ms. REINHARDT. You know, I do not know for sure and probably Dr. Robinson can answer that better than I can if there has been any surveys and so forth done.

But from the comments of teachers, yes, definitely these kids are learning, but what is interesting, Representative Moran, is the teachers are learning as well.

And I just got back from the State of Tennessee, and I believe they have just completed 12 different summer courses for teachers, and I know in Kansas we do 4 different summer courses for teachers. And so we are teaching the teachers as well as the youth, and the teachers are saying it is working.

Mr. MORAN. Thank you, Linda.

Mr. Jones, you described the growth in FFA. Where is that growth occurring? What kind of communities or high schools do you see FFA increasing?

Mr. JONES. FFA has been increasing at all levels. I know from the time I started in FFA, we had about 30 members, and by the time I graduated we had 130 members out of 260 high school students.

The growth into the urban areas where we have seen large growth into areas such as Philadelphia. The Indianapolis Star Academy is another; the Chicago Agriculture Science, those type of areas.

Moving into those suburban areas, too, where you are not basically considering a large city or even a rural area. It is some of the bedroom communities I guess you could say such as my town is that those kids see agriculture, but they still just do not know exactly what it is about, what agriculture and all the facets are.

We have had the opportunity to reach a lot of those young people. I was one of those young people that lived in an area like that. I knew about agriculture, but I didn't know a lot, and FFA gave me that opportunity.

I think that that is where we are seeing our growth becoming, is those people who are seeing the value and seeing the career opportunities in agriculture.

Mr. MORAN. Thank you very much.

Mr. Chairman, thank you. I appreciate this panel being here, and particularly Ms. Reinhardt, who I know personally. She and her husband have been great leaders in our State in agricultural issues and agricultural education in particular.

Thank you, Linda.

Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Goode.

Mr. GOODE. Thank you, Mr. Chairman.

Really I do not have a question, but I would want to commend the FFA, 4-H, and Agriculture in the Classroom. You have a big presence in Virginia's Fifth District. That is southside Virginia. I think nearly every high school has an FFA Chapter, and 4-H is throughout the school systems, and the Farm Bureau in that area works with Agriculture in the Classroom.

I would encourage you to continue familiarizing those in urban areas with agriculture. I think the future of agriculture is going to depend on our urban communities understanding the farm, especially the family farm, and I commend you for that. Keep doing it.

Mr. COMBEST. Thank you, Mr. Goode.

Mr. Chambliss.

Mr. CHAMBLISS. Thank you, Mr. Chairman.

I have got a two part question, first part to Ms. Raths and Mr. Jones, and the second part to our professional educators.

I am a little bit concerned about a trend that I have seen and I think all of us in this room have seen over the last number of years in agriculture, and that is the failure to attract folks back to the farm. And I know there a lot of different causes of it.

My son-in-law is a farmer, and Joe is very lucky to be able to live his American dream by being able to come back and work on a profitable farming operation with his dad. And I am afraid we are just not seeing as much of that now as what we need to see.

And I am curious, Mr. Jones and Ms. Raths, about the attitude maybe that you see among your friends and your colleagues in 4–H and FFA about, one, their desire to return to the farm and, second, the opportunity to be able to do so.

And to the educators, I am very pleased to see that we have got these kind of programs going where we educate folks about agriculture and what is going on in the agriculture community and what it takes to produce food to put on the table. But are we also doing some educating of folks about the opportunities in agriculture? Is that a part of these education programs, and are we reaching folks? Do you see any success in those areas about reaching folks to encourage them to come back to the farm?

Ms. RATHS. Addressing the wonderful question, one thing that 4–H does is we have a unique and wonderful tie to the Land Grant universities and the USDA, and that provides us, through our Extension Agents, we have a continual connection with the new research in agricultural areas.

And so through 4–H, 4–H'ers are getting direct contact with that new research and the new agriculture, like where they can go, new availabilities in agriculture, pest management research, you know, part of the natural sciences and things like that.

So 4–H has that continual tie to maintaining the youth and keeping them up to date with what is new in agriculture.

I know from my personal experience, I grew up in kind of an agriculture background, and I have a lot of friends, family who would love nothing more than to go back to the agriculture heritage that they came from, as well as myself.

And one thing that may be a challenge to you is some of the difficulties that they face doing that. One of them is the inheritance tax, the difficulty that we have acquiring the land after our parents pass away; also, the economic stature of just being able to make it in an agriculture program because of the increase in large corporation agriculture businesses and things like that.

So a lot of it has to do with economic standpoints and things like that that we are having a hard time because you cannot go to college to become a rancher or farmer. Once you lose that, it tragically is kind of gone.

So I have people that I know that personally that would love nothing more than to return to that because of economic situations, that is a difficulty.

But 4–H works very hard to keep our members up to date on all the new opportunities in research in agriculture.

Mr. JONES. I know last summer I got the opportunity to take a group of students down to Georgia to the Sunbelt Agriculture Expo—I know you would understand it, Mr. Chairman—and to see the look on their face in that area of production—that show is totally based around production—and to bring those kids back and for them to have that motivation there, and when they got back we really introduced them to one of our FFA programs, the entrepreneurship program. It is in production and in placement.

And what that does, it gives them the opportunity while they are still in high school to develop a system that they can already have a business started by the time they get out of high school. It may be a production business. It may be something that they are in placement within.

I have a friend that in high school who got involved with entrepreneurship in production and started his own nursery/landscape business, and by the time he graduated high school, he had the ability to attend college at night and run that business during the day.

I have other friends who started their livestock programs in high school through the Agriculture Entrepreneurship Program. They have seen these entrepreneurship opportunities that we have given them, that they have had to develop while they were still in high school, and these people are excited about going back to the family farm. They are excited about going back to production agriculture.

That is something that this year I have had the opportunity to really push around this Nation, is the fact that we can talk about agriscience and we can talk about agriculture business, but without production agriculture none of the rest of them exist, and that is something I really had the opportunity this year to really have an impact on.

Yes, the family farm is there. It is there for you to go back to. It is there for you to start on your own. If you want to be that entrepreneur to go out and start a new business, going back to production is something I have tried my best to get across, and I have seen a lot of people who are excited and enthusiastic about going back into production and becoming the producers that we will have for the next generation.

Ms. REINHARDT. If I might comment, I think Agriculture in the Classroom with just in awareness to these boys and girls in the classroom of knowing where their food and their fiber comes from might stem a start. Ah-ha, there may be a job available for me in that field.

We also have available to the States to use different computer programs. There is one that I am familiar with that is called careers, and it talks about the different careers in agriculture.

And certainly, I am pleased to hear the two speakers ahead of me talk about the estate tax. We in Farm Bureau are calling it "Kill the Death Tax," and certainly that is a concern to us because if we are particularly talking about production agriculture, we do have to have a Kill the Death Tax, so to speak.

But, yes, we are doing things in careers, but your point is well taken, and I believe that this is something that we can work on a little more as we move forward with the Ag, in the Classroom Program.

Thank you for that suggestion.

Mr. CHAMBLISS. I think in the last 100 or so years with 95 to 97 percent of the people living on farms to 2 or 3 percent today is pretty good trend. I think we are preparing our kids to export them, so to speak.

It is difficult in farm community. I hear people say, "You can go back to the farm one of two ways. You inherit it or you marry it," and that is the only way that you go back. However, the career exploration, talking about kids doing other kinds of things in the agriculture world, becomes the next best thing because as they said before about one-fifth, one job in five is agriculture related, whether it is teaching or banking or transportation or economists or brokers or researchers. There are jobs that are agriculture jobs, but they are not necessarily on the farm or on the John Deere.

Mr. ROBINSON. Perhaps, Mr. Chambliss, I could add only a couple of points because I think most of them have been made by my colleagues.

One way to look at opportunities within agriculture is the broader opportunities, not just production agriculture. The front end cost has already been explained by my colleagues in going back into agriculture. Yet when you look at the enrollment increases that are occurring in colleges of agriculture around the country, they are coming also from nontraditional backgrounds.

Many of these young people have no farm background at all, but they are interested in things such as the interface between agricultural production and the environment. They are interested in the science that underlies agriculture. They are interested in the food science issues, the food safety issues, the nutritional issues, all of which comprise what my colleagues here have mentioned as part of the broader set of employment and career opportunities for agriculture.

Mr. WILLIAMS. In our program, we began by writing a conceptual framework that has seven major objectives, and that is contained on page 4, the seven major objectives, of my testimony, and that kind of highlights the key areas that we think.

I am also very involved in the Agriculture in the Classroom Program in Arizona. We do a teacher workshop in which we visit everything from all kinds of producers, five different kinds of producers, as well as industry, FFA programs, so that the teachers, primarily fourth, fifth, sixth grade are exposed to these different opportunities, and through that see all the different careers that are available, and then they integrate that into the things that they are teaching, similar to what Dr. Price is talking about doing there in Oregon.

Mr. COMBEST. Mr. Baldacci.

Mr. BALDACCI. Thank you very much.

I just cannot say enough about the 4–H Program, the FFA Program, Agriculture in the Classroom Program, and all the people that are here today really doing the Lord's work, and I really want to say thank you because it has been one of the most exciting parts of being on this committee, is to be with those different programs in my State in Maine.

The district that I represent is the most rural east of the Mississippi. So I really appreciate what you are doing, and I believe, as Representative Clayton and others have spoken, that we know what it does and we want to get it out there more, I guess, would be where I would be coming from.

And I was reading your testimony, Kelly, and at the end of it you talked in your meeting with President Clinton and how he said that if there were all the young people involved in the 4–H program, we would have half the problems with our young people.

And I think that when we watch juvenile crime and violence and drug use and smoking and drinking and all of that, and we recognize that it is declining with adults, but it is increasing with juveniles, we need to not reinvent the wheel, but to look around and see those things that are already successful, and it is almost like I think it is a real opportunity for agriculture to come to the national front in a national summit with youth and young people to say, "Look. It is working. These are programs that are working, that are successful. Do not reinvent the wheel. Do not create a new Federal program or new mandates and guidelines and everything else, but work with what is successful."

And I think it is a real opportunity, you know, for you all to take the initiative with the auspices of the chairman and the members of the committee to forge into the national debate on prevention programs. And I really believe very, very strongly that this is the one aspect of agriculture that we need to nurture and give more resources to, knowing that money is not all of it, and I appreciate Agriculture in the Classroom.

But I think for years we have just sort of sat back and not really been as aggressive, and I really think we need to be because I think more and more the things that I learn about what the department is doing and farmers are doing is something that there should be more of those kinds of values throughout our community.

So my encouragement, Mr. Chairman, is to have agriculture and these young people and the people working in the department in this particular area to force themselves on the Justice Department in the national debate on these programs and say, "Do not reinvent the wheel, but take these programs that are working."

And I know that the 4-H program works because it lets young people do what they want to do, and it works around what their interests are, and I talk to so many young people that nobody listens to them, nobody pays attention to them so they get into trouble, and they are just hanging around with their friends, and they do not have the opportunity for these kinds of things.

And I talk to young people and ask them why do they get involved in 4-H. You know, what drew them? Well, a brother, a family member, a friend, you know, or a family. It is developing you know sort of like, you know, we have got to break out and get out and outreach.

And that is why I was so impressed that your opportunity to diversify from urban and rural in the membership in the 4-H program, and that you have actually taken that challenge and expanded the membership in that area, and we are talking in our committee about trying to reach some of those who are not familiar with agriculture, and you folks are the people who are going to make those connections for us and going to build those bridges for us into the urban areas, into the nonagricultural areas, and I think it is through this.

So, you know, I am a big supporter of 4-H and these programs of FFA, and I go anywhere in my district to speak with young people and to be with young people because I think that that is sort of something that our community, States, and country have been lacking, and that has been the glue that has held us together.

So my encouragement would be for you to get involved, and I will do and our office will do as much as we can to get the administration's attention, to force ourselves on them, and agree with President Clinton that if everybody was involved in the 4–H Program, that we would have half as many problems as we have.

But, Mr. Chairman, I just feel very strongly about that, and I think that agriculture can be part of the solution to a national problem with teens and young people, and we ought to present it in that fashion, and I think it would be beneficial to everybody.

Thank you very much.

If you would like to comment, you are more than welcome if you have got your own ideas about this, especially from our friends from FFA and 4–H.

Mr. JOHNSRUD. Mr. Chairman, could I comment a moment on that?

Mr. COMBEST. Yes, sir, certainly.

Mr. JOHNSRUD. A real life experience I think that will illustrate your point, and the committee, I think, should be sensitive it could happen in rural or urban America. It doesn't make any difference, but I was visiting with a young fellow in a HUD site one day that was in a 4–H program, an after-school program, and I said, "Why are you in this program?"

He said, "Because I'm learning a lot." This is about a 12-year old kid or 11. He said, "I don't want to be like my brother." He said, "You're going to see him come out of one of those houses about 4 o'clock. He's going on the street to sell drugs. I don't want to ever do that. This program is going to keep me from falling into that problem."

That is an 11- or 12-year old kid in California that saw that value. That is pretty powerful stuff, and that is not an isolated case.

Mr. CASE. Mr. Chairman, my vocational agriculture teacher years ago said, and I overheard this, if you want to keep at that time a young man from going wrong, is that you give that young man something to think about other than nothing or getting into trouble.

Agricultural education programs in the schools across this country provide that opportunity for meaningful learning through application in a business or in an entrepreneurial enterprise.

What you say is absolutely on target, and I have made a note to take you up on that offer about going to the Justice Department for the purpose of preventing what we are experiencing in terms of trouble with youth in the future. So you are right on target with what we think is going on in our program.

Mr. BALDACCI. Just to followup, we put together a commission in Maine. I had appointed the U.S. Attorney and the State's Attorney General, along with a whole host of people to review the issues, and it all came right back to where we were going off track and where the young people's problems were.

So I feel very strongly about it, and I know that the young people may have a perception about 4–H that it is agriculture, but one thing my friends in 4–H say is that they are more than just agriculture, and I think that whatever it is that gets an interest in the young people to participate is what we ought to be working on.

Yes, sir.

Mr. JONES. One of the things especially in FFA that we have that I have seen that gets people interested in agriculture, and I think it is the thing that returned my life back around towards agriculture as I reached an area where I was having to make a career choice between criminal law or agricultural law; what changed my life back around was the fact that when I went to national convention again for the third year.

And if any of you want the opportunity to re-believe in agriculture and re-believe in the youth of this country, I have got about 42,000 of my closest friends coming to Kansas City in November, and we invite you to show up and be there with them and see that sea of blue jackets walking around Kansas City, around Municipal Auditorium.

But through the convention, we give those young people the opportunity to not only experience all the facets of agriculture, all the different corporations, all the different businesses and industry that are involved with agriculture, have the opportunity to develop leadership, the opportunity to meet new people from around the country and see that, yes, there is a future in agriculture, and there are others out there like me who are involved, as well.

So if you do have the opportunity, I encourage you to come out to Kansas City in November and join us in our national convention.

Mr. BALDACCI. Thank you.

I am sorry.

Ms. RATHS. Oh, I am sorry. Just a real quick comment that what you said was just wonderful, and from personal experience, everything you said just really touches home, but if you ever have any doubt, or like Mr. Johnson, if you ever have any doubt in the youth or anything like that, from personal experience through 4–H, to look into a child's eyes when they can choose whatever they want to do, because every person, every one of us is blessed with amazing and unique gifts, but we are not always given the opportunity to identify those or pursue those, and that is what 4–H does. That is what FFA does, and to watch them light up and be so passionate about life and what they are learning is very, very awesome, and I just really appreciate your comments.

Mr. COMBEST. Mr. Jenkins.

Mr. JENKINS. Thank you very much, Mr. Chairman.

I am sorry I missed part of the testimony. I had to be at another meeting, but I do thank all of you for the fine job that you have done.

This may have been mentioned, but I did not hear it. There is one thing that concerns me, and I am familiar. I have been a 4–H'er, belonged to the Farm Bureau. I make memorial gifts to Agriculture in the Classroom, and I think that is a good way to finance it.

But despite the efforts that you are all making, and they are great efforts, I am concerned that as you are in the classroom and in the schools and as you teach about agriculture, that somewhere in another part of the school that there are efforts that are directly contrary to the efforts that you are making. There are efforts that conflict with the objectives of production agriculture.

Now, I am going to be supporting you as a freshman here. I hope to come back to this Congress, and I am going to be supporting all of your efforts in every way that I can, but I am hoping that you will let this committee know not only what you are doing, but let us know those efforts that are in conflict because I think there are some real conflicts out there that need to be addressed.

I think when we talk about the good work that you are doing, we need to talk about the other work that is being done and how we can mesh these two together so that they do not conflict and so that they help everybody to reach their goal, and if any of you have any thoughts along those lines today, I would be glad to hear them.

Ms. REINHARDT. You mentioned the Farm Bureau organization, and certainly we are very aware of that, and I know that I have worked directly with all the States, but also very closely with the State of Kansas, and we have monitored textbooks to see what is in textbooks, and we have now had our district women chairmen go out and see who is on the school boards and make the school boards aware of some of this information that is not liken to our philosophy and to production agriculture.

As an organization I am speaking from now. We are doing what we can and are very aware of this problem.

Mr. COMBEST. Thank you very much, Mr. Jenkins.

Mr. Smith.

Mr. SMITH of Michigan. Mr. Chairman, thanks.

Well, as an old 4-H'er and FFA star farmer, and as a farmer depending on the Extension Service for a lot of information, I guess one of my concerns is as actual farmers' children become a very small minority in the population of those no win FFA or 4-H or even with the Extension programs as we expand into cities and nutrition, I am somewhat concerned about not having the kind of emphasis on production agriculture that we once had, and I do not want to detract from the importance of the expansion of these programs into urban areas, but I would observe that no longer do we have programs on the flock of sheep, but maybe on how to show one sheep.

We tend to expand into urban areas and nonproduction agricultural areas simply because the population of that 1 percent in farming now is so small, and so I am just a little concerned that we are not giving the kind of information that encourages even those few kids that are on the farm, going into 4-H and FFA and Extension, and even Farm Bureau to some extent as Farm Bureau expands its insurance program for a larger share of its membership.

I would like your comments on the danger of de-emphasizing production agriculture as we concentrate on the large majority of the population in the different units you represent.

Does anybody have a comment?

Ms. REINHARDT. First of all, we want to remember that Farm Bureau is an organization for farmers and ranchers and just not the insurance company.

But as we look at——

Mr. SMITH of Michigan. Also, I am a former State Director of Farm Bureau.

Ms. REINHARDT. OK, fine, fine. Just wanted to clear that up, you understand.

As we look at the problem that you are saying, I believe that we probably are getting some information out there about what farming is all about.

Mr. SMITH of Michigan. Oh, no, that is not my question. What farming is all about is what we need to aggressive pursue as we expand the information base to get more people at least familiar with what production agriculture is.

My concern is in FFA and 4–H, doing the kind of things for expanding your herd, how to crop that 3 to 400 acres. Are we de-emphasizing some of that education and training as somewhat of a sacrifice as we pursue the goals for the larger majority?

Ms. REINHARDT. So, in other words, you are saying that what maybe the majority of the people are seeing is that prize steer being showed at the American Royal or at the fair rather than what is happening right there on the farm?

Mr. SMITH of Michigan. Maybe how do you manage that herd instead of the individual. I mean, it is probably not as evidence in Farm Bureau as it might be in FFA and 4–H.

Ms. REINHARDT. That is true.

Mr. SMITH of Michigan. And with the Extension Service.

Ms. REINHARDT. And certainly the young people at the end of the table can answer that best.

Mr. SMITH of Michigan. What are your thoughts, Mr. Jones?

Mr. CASE. My thought on that in terms of high school agricultural education is that certainly we have to diversify the curriculum in order to take care of a broad base of interest, as well as attracting those people, but certainly I do not believe that we have left out production agriculture.

Production agriculture is key to or the basis for all the rest of it, and in terms of herd management versus an individual steer and that type of thing, I think that our semester class breakdown, I believe that the instruction is there. I would stand corrected on a study, but certainly it is not the predominant——

Mr. SMITH of Michigan. No, I do not care about it being the predominant. I know it cannot be the predominant anymore. I am just concerned that we are sacrificing some of the training from how you run a farm versus how you show your project.

Mr. CASE. There is some moving toward how to run a business rather than how to run a farm. I will grant you that. However, I do believe that there is a sufficient amount of production agriculture still in the curriculum if that is your question.

Mr. SMITH of Michigan. Good.

Ms. RATHS. In 4–H, we do not deny that we are an agriculture based program. That is what we came from, and that is our roots, and as we move, it is not our goal to move and diversify into the urban areas, but it has been there is a call for it, and so naturally we have taken up that.

But even though our program has moved into urban areas, our basis of education and projects, 55 percent of those remain with the biological sciences, and so we stay with such things as in an urban area teaching people how to garden, you know, the production of what you can do, and so we very much stay close to that agriculture base as much as we can, and it continues to be our most popular projects and what we pursue the most in 4–H.

Mr. JONES. If you look at the FFA Program, if you look at our awards, our proficiencies, our placement areas, over three-fourths of all those categories are involved directly with production agriculture. So, yes, we are moving into these fascinating, new areas, but we have not forgotten where we came from, and over three-fourths of everything we do is still directed towards that production and how do we enhance what we have in our supervised agricultural experience programs.

Mr. SMITH of Michigan. Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Schaffer.

Mr. SCHAFFER. Thank you, Mr. Chairman.

Dr. Price, I was reading your testimony about food and fiber curriculum, and I just had a couple of questions.

On the curriculum itself, it is targeted for sixth and seventh grade students. I wanted to just get your rationale for that age group. Why that age group and just the applicability to other age levels?

Mr. PRICE. Well, it was, as pointed out, the consensus of the educators involved in the discussions over the last year.

Two, I think there is an emphasis of encouragement from the vocational agriculture teachers at that grade level. We also have a beautiful ground of recruiting.

So that, along with the grade level, probably just before too many hormones are grown and at a time when kids are eager to learn, and sixth and seventh graders really are, we think there is a lot that can be conveyed to youngsters about the world of agriculture.

Mr. SCHAFFER. How much coordination do you envision or could you just comment on the topic of coordination between Department of Agriculture, Department of Education, and so on, with respect to agriculture education, and in your project here in particular?

Mr. PRICE. Well, I suspect there is very little coordination at the Federal level between the Department of Agriculture and Department of Education, but that is probably all right.

I think we have got to take a project that we believe in and are working on and have it become a grassroots approach of desire, wanting the materials, and encouraging and everything else is going to follow.

Mr. SCHAFFER. Could you comment on the state of teachers' colleges throughout the country, again, from your perspective or anybody else here, as well?

It seems to me that the strength of curriculum, whether it is agriculture or economics, math, or whatever the case is, has an awful lot to do with the training teachers receive in various State teachers' colleges. The criticisms of those institutions over the last few years has been pretty significant in just preparing teachers to do an adequate job of conveying curriculum effectively to their students.

With respect to the subject matter of agricultural education, could you comment on or give us your assessment?

Ms. REINHARDT. Well, agricultural education, frankly, occurs pretty well in a very few institutions that provide the training for agriculture teachers. It is very, very well done, and that is where it ends.

In our State, in the State of Oregon, we have need for many more agriculture teachers each year than we have availability. So we are down visiting our friends in California and encouraging those people to move north. We need them up there.

We have perhaps need for 50 agriculture teachers a year in our own Oregon State University, which produces about 14. So we are recruiting agriculture teachers, and we have found some particular places that do a great job, and they are tremendous people to bring into our school systems.

Mr. SCHAFFER. Any others have comments on that topic?

Mr. CASE. A couple of things. First of all, on the comment about the coordination of agricultural education between USDA and the Department of Education, I am with the Department of Education, and I work routinely with Bob Robinson's shop, the 4-H leadership, and the higher education folks on several initiatives that we have in common.

In addition, I work and partner with the National Council for Agricultural Education and National Vocational Agriculture Teachers Association, who also work with USDA.

So there is a considerable amount of coordination and communication going on with these programs.

My perception of teacher preparation is that the agriculture teaching profession certainly needs more teachers across the country, and we are pursuing efforts to try to recruit young people into the agricultural teaching field because he is right. There is a shortage of agriculture teachers across the country.

I do not have any basis to give judgment though on teacher colleges, as to how much agriculture they teach. My guess is very little, but that is a guess.

Mr. SCHAFFER. My time is almost up here, but Mr. Jenkins mentioned the conflict that occurs in some subject matter in schools and the conflict that presents to agriculture curriculum.

Let me take it a step further. I think he is talking about or, well, I would be talking about some of the environmentalist curriculum, and so on, which really runs contrary to agricultural values. People in agriculture are the real conservationists, the real environmentalists, and the kinds of things that are helpful in promoting those industries often throw an awful lot of water on the efforts of environmental zealots that make their way into classrooms.

Particularly, Dr. Price, how much of that conflict do you see and could you comment on that?

Mr. PRICE. I would like to see schools stay in the business of education, not into taking political issues. I think it is important to be aware of political issues, but to be into the environmental issues in public schools, you know, it is a pretty quick death, a pretty quick death for teachers, superintendents, school board members.

I come from Oregon where we had the great spotted owl appear. I have spent most of my life in the woods and do not think I have ever seen one, but I guess there is a bunch of them out there. [Laugher.]

Mr. SCHAFFER. You have got to look at the K-Mart signs. That is where they hang out.

Mr. PRICE. It has created some major kinds of problems, and if you want to talk about Western water issues and land use and using grazing land, you can get political real quick, and pretty soon the schools are condemned for getting into political issues.

So one of the things I have said in my testimony today is we have no intention of getting into the environmental issues. We do have an issue of pointing out what political issues are at this level and throughout the high school, but not to teach to one side or the other.

Mr. SCHAFFER. Thank you, Mr. Chairman.

Mr. COMBEST. Thank you.

I would like to once again thank our panel for appearing.

Just a couple of personal notes. Dr. Price, you mentioned in your written testimony Guy Finstead, who is from Texas, and vocational agriculture teachers. He was an agriculture teacher in my congressional district when I was Area One president.

And I would say, Ms. Reinhardt, I used to cut wheat every summer in Kansas on wheat harvest. I am very familiar with Kansas, and if you are truly interested in learning about and interested in learning about cotton, I will tell you more than you ever want to know. [Laughter.]

Mr. COMBEST. Thank you all very much for appearing here today.

Our next panel is Dr. Robinson, who will remain at the table; Dr. Charles Crabb, director, University of California, division of agriculture and natural resources; Dr. William Lambert, assistant dean for extension, University of Georgia, College of Agriculture and Environmental Sciences; Mr. Mike Ellis, vice president, Kentucky Small Grain Growers; Mr. Jon Stauffer, representing the AgrAbility Program of the National Easter Seal Society, and he will be accompanied by Randall Rutta, who is vice president, government relations, National Easter Seal Society.

Dr. Robinson, we will begin with you at your pleasure.

STATEMENT OF BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. ROBINSON. Thank you, Mr. Chairman.

I am pleased to be on this panel to speak with you today about USDA's Extension Programs. I remind you, if I may, once again of the principles that we spoke of, and they are contained in my written testimony, and rather than go over them, I will only refer to a couple more as I move into the Extension Program of the U.S. Department of Agriculture.

The goal of the Department of Agriculture and the Research, Education, and Economics agencies, is to continue to invest in creating and strengthening the research and education capacity essential to meeting national goals for the food and agricultural system.

Second, the programs of the mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.

As you are well aware, in 1994, as part of a reorganization of USDA, Congress merged the former Extension Service and the former Cooperative State Research Service into one agency, the Cooperative State Research, Education, and Extension Service, which

I am the Administrator of, quite a mouthful in terms of either acronym or name.

The mission of CSREES is to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and Extension programs in food, agricultural, and related sciences, and in partnership with both the public and private sectors.

That partnership is very broad. It includes the Cooperative Extension Services and 103 land grant institutions. It includes 3,150 county and administrative units throughout the country. It includes 59 State and territorial agricultural experiment stations, seventeen 1890 land grant institutions, including Tuskegee University, 63 colleges of forestry, 27 colleges of veterinary medicine, 42 schools of home economics, and more recently, 29 Native American institutions which now have land grant status.

In creating CSREES, Congress intended that the agency create stronger linkages between research and education. Examples, I think, are important in that area.

The first example of Extension programs and research programs that are beginning to integrate in terms of problem solving is in the integrated pest management area.

Achieving Federal goals requires cooperation with the university system. Let me give you a few examples. The IPM research and education conducted at Texas A&M has saved the economy $1.5 billion and reduced the use of pesticides and insecticides by 17.3 million pounds.

Similar programs are conducted in many States, including Missouri, Louisiana, and many other States. These are programs where research and education are integrated in order to solve the problems confronting people who have interest both in production agriculture and in the environment.

The President's Food Safety Initiative, which is part of the administration's fiscal year 1998 budget request includes $9.1 million for USDA, $4 million of which is for CSREES research and Extension. This is one of the most recent examples of how to integrate research and Extension objectives.

Consumers demand and should be assured of a safe food supply. Both research and Extension have the potential to help reduce or eliminate food-borne risks.

The Midwest Water Quality Initiative, also called MSEA, or the Management System Evaluation Area project, is supported as well by integrated research and Extension programs in water quality. In Iowa, for example, producers have developed greater understanding of practices to improve efficient nitrogen use to reduce surface runoff; to better use buffer and filter strips; and to efficiently manage application of herbicides in order to reduce their presence in the environment.

Extension's Expanded Food and Nutrition Education Program very effectively teaches nutrition to low income audiences in all 50 States. Nationwide evaluations of the program report that 85 percent of the program participants improved management skills, such as planning meals or comparing prices; 91 percent reported improvements in nutrition practices.

Funding for the Extension programs are authorized under the Smith-Lever Act of 1914, as amended in 1977 and 1994. The Cooperative Extension System is funded jointly by Federal, State, and local Governments, with the majority of the funds, over 70 percent, provided by non-Federal partners.

Extension based programs are provided with Smith-Lever 3(b) and (c) funds which are distributed to States under statutorily defined formulas. The programs funded through these base funds comprise the core mission of CSREES and the Cooperative Extension System.

The current base programs are agriculture, natural resources and the environment, nutrition, diet and health, community resources and economic development, 4–H and youth development, which you heard in the previous panel, family development, and resource management.

Many national initiatives are funded both through the base program funds and through special funds appropriated under Smith-Lever 3(d). These programs currently are in areas of children, youth, and families at risk, managing change in agriculture, food safety and quality, communities in economic transition, water quality, and sustainable agriculture.

Extension is known, Mr. Chairman, as an agent of change and, in fact, has an ability to design, develop and deliver educational programs that meet the unique needs of people as they adjust to change. It is important to point out Extension's ability to leverage through these programs change for the benefit of producers and consumers. These programs are dependent on active partnerships between the program personnel and stakeholders, and is accomplished through sound strategic planning.

The Cooperative Extension System is also an efficient technology transfer agent, transferring technology to the production sector and to other users of programs in order to meet a changing environment.

The Extension System also enters into a number of partnerships. These partnerships help leverage the funds appropriated to USDA in order to address problems identified at State and local levels, and we are working with the Natural Resource Conservation Service, the Agricultural Research Service, EPA, and others to explore and strengthen linkages.

We are working with the Departments of Housing and Urban Development; Health and Human Services; and Education to cooperate to provide economic opportunities and support services to public housing and other residents. HUD and HHS are making $2.5 million available in grant funds to support competitive grant programs under the Community Partnership for Resident Uplift and Economic Development.

All of these partnerships result in leveraging funds appropriated through the Department of Agriculture to help people address change.

Mr. Chairman, I want to thank you again for holding this important hearing, and allowing us the opportunity to speak about the Extension programs. I plan to present a comprehensive overview of the administration's position on reauthorization of the research, education, and Extension title at the hearing next week, and I will certainly be able and willing to discuss these programs and answer questions that you may have.

Mr. COMBEST. Mr. Dooley, would you like to welcome our next panelist?

Mr. DOOLEY. Thank you, Mr. Chairman.

It does give me a great deal of pleasure to introduce Dr. Charles Crabb, who is a constituent and also plays an instrumental role in coordinating the efforts of the University of California for the south central region of the Central Valley, CA, which includes, I think, probably the first, second, and third leading counties of the Nation in terms of agriculture productivity, and probably almost has a cumulative agriculture production base of probably approaching almost $10 billion, and so he brings a great deal of practical expertise to some of the issues we are dealing with.

So thank you for joining us.

Mr. CRABB. Thank you.

Mr. COMBEST. Dr. Crabb.

STATEMENT OF CHARLES CRABB, REGIONAL DIRECTOR, UNIVERSITY OF CALIFORNIA, DIVISION OF AGRICULTURE AND NATURAL RESOURCES

Mr. CRABB. Mr. Chairman, distinguished members of the committee, good morning. Thank you for the invitation to appear before you today.

I am Dr. Charles Crabb. I am the director of the University of California's Agriculture and Natural Resource Programs in what we call the south central region of the State. That includes 12 counties. Within those 12 counties are 6 of the 10 leading agriculture counties in the Nation.

Since 1914, the University of California Cooperative Extension has been engaged in taking the university to the people of California. The roots of some of the State's most notable commodities, such as citrus, nuts, grapes, and vegetables, took firm hold during the second decade of this century when the University of California Cooperative Extension advisors brought the latest discoveries to the rural majority of California's population.

Today, with a total budget of more than $64 million, 61 percent of that State funded, 19 percent Federal funded, and 20 percent of the funding coming from local Government and the private sector, U.C. Cooperative Extension operates in an environment vastly different from those pioneering farm advisors of 1914.

Agriculture, however, is still the State's leading economic generator. The farm gate production for California totals $22 billion.

Each of the residents of the State of California benefit each day directly and indirectly from the impacts of the University of California Extension Program.

Limited resources and growing demand presents challenges that are met, in part, through expanding partnerships with the private sector. To give you some examples of those partnerships, let me start with an activity that was carried out by the University of California School of Veterinary Medicine.

There is a location in Tulare County where they conduct field research. Working with the California Milk Advisory Board, Pharmacia-Upjohn, the U.S. Department of Agriculture, and the

California Department of Food and Agriculture, they were able to develop a vaccine against a deadly E. COLI—mastitis—that infects dairy cows.

A close link between research and Extension accelerated the adoption of the new vaccine within the dairy industry, and it has been estimated that the impact of that vaccine has saved the California dairy industry as much as $11 million annually, and the United States dairy industry over $50 million annually, and it helps insure a constant supply of low cost, safe milk products for consumers.

Another example of the value of public-private partnership is illustrated with the research and Extension advancements being made possible by the development of the state-of-the-art fruit handling facility at the Lindcove Research and Extension Center in Tulare County.

A modern fruit handling facility was developed with funding from the California citrus industry. Research by both campus based faculty and county based advisors contributes to the success of that partnership.

As a third example, at another field research facility a number of years ago, ARS, the Agricultural Research Service of the USDA, determined it was not possible to keep the Shafter Cotton Research Center open. Today the Shafter Research and Extension Center is operated by the University of California and funded by the cotton industry.

The partnership with the private sector allow the university to focus on funding the human resources necessary to conduct the applied research at the center, and it fostered a restored participation at the center by ARS.

Representatives from the cotton industry worked very closely with the University of California to help insure the highest priority research is being carried out at that Research and Extension center.

To meet the growing challenges, we have also embarked in a fairly comprehensive planning process. Two months ago the Division of Agriculture and Natural Resources released a summary of their strategic plan entitled "The Challenge of Change," and I have included this for the record.

It recognizes that the resources are scarce, and the achievement of our goals require us to do more with limited resources available to us, to set priorities, and to consult regularly with our stakeholders. In developing the strategic plan, we have considered interrelated trends which have profound implications on the division's scientists and educational expertise.

The development of a strategic plan to respond to the challenges requires input from hundreds of scientists, educators and stakeholders over a period of several years. The resulting "Challenge of Change" plan includes both program priorities and organizational management strategies.

A decision was made within the Division of Agriculture and Natural Resources to involve a broad range of stakeholders to review our strategic planning efforts. We think it is important, and it is a goal, that we insure that our sense of the future is reasonable and that our priorities align well with the needs of those who will feel the impact of our programs.

Reauthorization of title 8 of the farm bill presents those of us involved in agriculture education, research, and extension an opportunity to improve a system that over the years has proven the ability to adapt and succeed.

New problems will continue to emerge. Protection of soil, water, air, and other natural resources will continue to be more challenging as growing populations push the urban and suburban boundaries onto our farmland.

With move away from Federal crop support programs, economic risks associated with agricultural production will increase. We believe increased knowledge is one way to mitigate those economic risks and to help insure reasonably constant, low cost supply of domestically produced food.

. Continued public support of the continuum between agriculture education, research, and extension programs will be critical to providing the increased research based knowledge necessary to sustain the substantial economic contribution agriculture makes to California and other States.

Mr. Chairman, members of the committee, thanks again for the opportunity to appear before you today and talk about the important issues related to Cooperative Extension. I will be happy to answer questions at the appropriate time.

[The prepared statement of Mr. Crabb appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Dr. Crabb.

Mr. Chambliss, would you like to welcome our next panelist?

Mr. CHAMBLISS. Yes, sir, I sure would, Mr. Chairman. Thank you.

And it is a real opportunity, a real pleasure for me to introduce a good friend to this committee, Dr. Bill Lambert, who is the assistant to the dean of the College of Agriculture and Environmental Sciences at the University of Georgia.

Dr. Lambert has been a good friend of mine for many years. He was the Extension entomologist at the Experiment Station in Tifton for, about 20 years or so, and I had an opportunity to work with him on a number of individual cases.

Mr. Chairman, you will be interested to know that one of the most, if not the most, successful programs that we have had for our cotton farmers has been the Boll Weevil Eradication Program, and this gentleman, Bill Lambert, was very much an advocate of that program early on. He was responsible for its implementation and just did a super job with it, and I have heard untold numbers of my farmers tell me that Bill Lambert does a better job of bringing the laboratory to the field of anybody they know of.

And it is a real pleasure for me to have a good friend, Dr. Bill Lambert from the University of Georgia, here today.

Mr. COMBEST. Thank you, Mr. Chambliss.

Dr. Lambert.

STATEMENT OF WILLIAM R. LAMBERT, ASSISTANT DEAN FOR EXTENSION, UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Mr. LAMBERT. Thank you, Congressman. I appreciate those comments. I am flattered.

Mr. Chairman and members of the committee, I appreciate this opportunity to be before you this morning to talk about agriculture in Georgia. Georgia's agriculture is very diverse, much like my colleague here in California.

When you think of Georgia's agriculture, you think of peanuts and you think of Georgia peaches, but it is a lot more than that. We are the leading producer of pecans. We plant the second largest acreage of cotton in the United States. Depending on the year, we are either third or fourth in vegetable production, which includes as many as 30 to 35 different types of vegetables in the State.

Livestock and poultry actually generate more income for the State than our crops do, and forestry is certainly a very important part of our economy.

I would like to make several points with you today, and I am sure that you agree that cooperation between individuals, groups, organizations is critical to having successful programs, and I would like to convey to you that Extension programs are doing just that.

It is important that we have a continuing research and Extension effort that can deal with opportunities as they arise and problems as they develop. This requires that people be in place, trained in the techniques required in develop and communicate new information with the credibility that only time confers.

The Experiment Stations and the Extension Systems have provided this continuity and stability. I would like to share with you today just two examples of Extension programs in Georgia that exemplify this technology transfer function, and one of them Congressman Chambliss has already mentioned, but the first I would like to talk to you about is water quality because that is an issue that concerns all citizens of Georgia and, of course, the Nation.

The upper Floridan aquifer is a primary source of drinking water and industrial process water in southeast Georgia, near the Georgia coast. It is also the primary source of water for agricultural irrigation. Recently concerns over salt water intrusion have prompted restrictions on the agricultural use of this groundwater.

Georgia's Environmental Protection Division held public hearings to determine the impact of these restrictive actions. Extension had the responsibility of educating the agricultural community about these hearings and their potential impact on agriculture.

As a result of this effort, the agricultural interests pointed out the lack of data on water use to support the restrictions. Farmers told of the lack of alternative water sources for irrigation, but most importantly, they pointed out that there was a considerable distance from agricultural use from salt water as compared to the large municipal users and the paper mills immediately on the coast.

Extension later organized a strategy meeting to coordinate all interests affected by the water use issues: commodity groups, agribusiness, Government and farmers. As a result, a group called

Water Stewards was formed to serve as a clearinghouse for information on water stewardship for Georgia's agricultural community.

This group has met with EPD and successfully negotiated a more reasonable course of action. Each affected county will develop a comprehensive water use strategy, and this is with Extension's help, and institute a water use educational program.

Research and Extension scientists will cooperate with water stewards and the U.S. Geological Survey to monitor agricultural water use to develop a realistic database on which informed decisions can be based.

Finally, let me tell you about a program that has had a major impact that Congressman Chambliss has just mentioned to you, the Boll Weevil Eradication Program.

The boll weevil has been a major limiting factor in cotton production in many parts of the United States. It has been particularly serious in the State of Georgia. Since it has few, if any, natural enemies, the boll weevil required repeated insecticide applications. These were costly and disrupted natural enemies of other pests.

There is always the concern that agricultural chemicals pose a threat to the environment and man. Georgia cotton growers had to use over 10 sprays each season to protect their crop from insect pests, and this was at a cost of about $100 per acre.

In the early 1990's, the University of Georgia's Extension Service, working with the Georgia Cotton Commission, Georgia Farm Bureau, Georgia Department of Agriculture, National Cotton Council, and the USDA, and others, began planning for an eradication program in Georgia.

Cotton producers had to be convinced that the eradication of the boll weevil was possible, and at the expected cost of $105 per acre to the grower, it was a sound investment.

During the active phase of the eradication program in the late 1980s, several major problems threatened to kill the program, including serious secondary insect pest outbreaks and cost overruns, but perseverance by the program supporters and trust by farmers allowed the program to continue.

By 1990, most of Georgia was weevil free, and the benefits of the eradication program became apparent. Insecticide use declined steadily each year after the eradication program as producers learned better ways to manage other pests. Soon fewer than three sprays were needed to product a cotton crop.

The cost to the cotton producers was reduced significantly and the yields increased. More farmers turned to cotton, and acreage increased from less than 200,000 acres in the early 1980's to 1.5 million by 1995. It is estimated that the savings in insecticides alone account for $100 million annually in our State.

The eradication of the boll weevil could not have been done without several key factors. First is the cooperation of organizations that I mentioned earlier. All of these groups share different interests. But they were united in their commitment to get rid of the boll weevil.

Second, Extension's long-term service to agriculture and the trust in this organization's commitment to farmers brought credibility to the eradication program from the beginning. When additional money was needed to meet unexpected expenses, Extension was able to convince producers of the wisdom of increasing expenses' assessments and to continue the program.

Research and Extension scientists also were asked to deal with severe outbreaks of secondary pests that were encountered in the program.

Finally, ongoing programs in research and Extension were able to provide farmers with technology that enabled them to realize maximum benefits from elimination of the boll weevil.

The Boll Weevil Eradication Program's success story is a good example of the wisdom of having a continuing effort in place that can deal with new opportunities and problems as they arise.

Mr. Chairman, members of the committee, thank you again for allowing me to bring these examples of success from Extension programs to you this morning.

Thank you.

[The prepared statement of Mr. Lambert appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Lambert.

Mr. Lewis, would you like to welcome our next panelist?

Mr. LEWIS. Yes. Thank you, Mr. Chairman.

Mr. Chairman, I would like to introduce and welcome Mike Ellis. Mike is a farmer from Shelby County, KY. He, along with his brothers, farm 4,100 acres.

Mike is someone that knows the true benefits of modern technology, precision agriculture, research and dissemination of that research. It is a great asset to his farm, and it is something that I know he supports and looks forward to entering the 21st century with the type of farming techniques that are going to make farmers profitable.

And it is good to have you today, Mike.

Mr. COMBEST. Thank you, Mr. Lewis.

Mr. Ellis.

STATEMENT OF MIKE ELLIS, VICE PRESIDENT, KENTUCKY SMALL GRAIN GROWERS

Mr. ELLIS. Yes, thank you, Mr. Chairman, and thank you, Congressman Lewis, for your support of agriculture and particularly from the State of Kentucky, with Congressman Baesler from Kentucky also. We are fortunate to have such willing people to see after a stronger U.S. agriculture here in the country.

I might clear up one thing for the record. I moved on from vice president of the Kentucky Small Grain Growers to president and now moved on to Promotion Board, where we are charged with the responsibility of billing out the check-off monies for the State of Kentucky from producers across the State for research and betterment of small grain growers in the State of Kentucky.

I would like to share more from my personal experiences, recognizing that many of the members of the Small Grain Growers in the State of Kentucky have farming operations similar to and problems similar to what we experience on our farm.

I have been farming for on the order of 28 years now in Shelby County. Initially we started by soliciting the help of the University of Kentucky Farm Analysis Program, and they helped to pattern our farming operation and management techniques.

I farm with two brothers, Bob and Jim. Bob oversees the dairy, 200-cow milking herd, and market or sell a little over 3 million pounds of milk per year, and then Jim's responsibilities are the hog operation, where he markets over 3,400 head market hogs a year.

All three of us have a B.S. in agriculture from the University of Kentucky. Jim also has a Master's from Ohio State.

I guess basically I cannot say enough for the effect of research and Extension in our operation. We have from day one sought their help. We have used their advice. We have sought their research. I was a part of a club in Shelby County, a grain club. By the way, I kind of went past the fact that I have the oversight on the farm of the grain production and the record keeping, but as a part of a grain club in Shelby County, we annually go to the university and sit down around the table with the researchers and talk about their research, what they are finding, and we interact with them every year. That is a valuable part of our winter schedule.

The Extension program has really been the major part of our success in the farming operation. We have, for an example, in the Farm Analysis Program realized early on that no tillage had a real place in the farm, not only from a conservation standpoint, but also from economics. From less trips over the field, less fuel consumption, less labor requirements enabled us to farm the acreage that we inherited in the family. My dad and uncle started in the 1920's farming and passed that farm on to us, and so we had a wonderful opportunity, a lot of resources, but how do we maximize the returns on those farms and be good stewards of that farmland at the same time?

And so we were introduced through the Farm Analysis Program and the Extension Program, which sponsored Harry Young and no tillage in the western part of the State in the 1960's, and so we picked that up, and we used that.

We no till many of our acres today, and we keep the pesticides in place using that.

We have adopted the Ohio State's Sow Productivity Program through my brother going to Dr. Dennis Liptrap at the University of Kentucky and saying, "There must be a better way for me to keep and select my breeding stock to keep in the herd," and so Dr. Liptrap was looking for somebody that would participate with him, and on the mainframe at the university he put the data in and started us out there.

Then that has developed our herd. We have now got that program on our own computer. We developed it on our own computer. We then have now gotten a commercial firm that supplies software that we are participating in the true Ohio State Sow Productivity Program, and we get a lot of service from them. So we are hiring more services that way.

Now, the Farm Analysis Program is also an interstate thing because they use the Illinois program as a basis for their program.

I could just go on and on about the benefits that we have received from the Extension Service and from the research that they do, but I want to get to the heart of my testimony here before you, and that is the concept that if we do not fund precision agriculture to the greatest extent that you all can here in the Congress, then

I figure that we are going to cut off the Land Grant colleges from mainstream agriculture.

That is the direction that agriculture is going. We are going to affect all of the other issues that have been brought up here—pesticide use, keeping it in place, wise use of inputs, IPM Program, which we participated in and has had a big effect.

We are going to have better controls over all of those things. There is a fellow I visited from Hebrew University last week here on our farm from Jerusalem, Israel, and he could not get over the possibilities looking at one of the yield maps from one of our fields of what he could have his students do, the theses that they could write, just the breadth of what he saw in that data and the ability to affect change and a better agriculture.

We are going to see the ability to keep the pesticides in place we can program in the wintertime. As this evolves, we will program in the wintertime where the herbicides go and where they do not go. We can program on a card or we will be able to.

See, it is all evolving. The knowledge is there. It just has not been fully developed yet, but they are applying already fertilizers by using a PC card, and you program where to put that and what rate to put that, and if a custom fellow pulls in on your farm, a dealership, and tries to put fertilizer on your neighbor's field, it will not put it on because it is not in the right location.

So it gives me the ability as a farm manager to extend my skills by programming into that, my management abilities to farm more acres, to have control over the pesticides, have control over varieties, where they are grown. There are just all kinds of benefits that are going to grow out of this program.

And not to have Extension involved in this research that has been to a large extent developed from the farmer level, from the industry, but we need unbiased research being done and methods to apply. We need crop models to know where to reduce nitrogen levels. We are already reducing nitrogen levels and putting them on at the right time. Now we can take it a step further and only put on that which a crop model says is necessary for production.

So I would just like to urge you here today not to separate the Extension Service and to fund as fully as you possibly can precision agriculture in this new adventure or this new society or this new agricultural environment we are in. We are in the information area, or the information and technology area of agriculture as opposed to the nitrogen era where we are going to see major changes brought to agriculture from this application of technology.

So I thank you for your patience and appreciate your invitation for me to come and share my testimony.

Thank you.

[The prepared statement of Mr. Ellis appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Mr. Ellis.

Mr. Stauffer, Mr. Barrett mentioned that you were from Nebraska. He had another hearing that was going on in another committee. He was hoping to be back. Seeing that he did not make it, maybe he will before we have completed this, but he wanted to welcome you here, as well.

We appreciate your coming.

STATEMENT OF JON STAUFFER, AGRABILITY PROGRAM OF THE NATIONAL EASTER SEAL SOCIETY

Mr. STAUFFER. Well, good morning. My name is Jon Stauffer. I own a farm near Melford, NE. I have been farming for 29 years. We run a farrow-to-finish hog operation which markets about 1,700 head of market hogs per year.

Also, we have 800 acres of cropland, and that is corn and soybeans.

I also have a disability. I have received services from the Nebraska AgrAbility Project and now volunteer as a member of the project's Peer Network.

I am accompanied by Randall Rutta of the National Easter Seal Society.

I was born with a rare bone disease that caused my bones to grow too quickly. From childhood to adulthood, I had over 20 surgeries, and due to this disease, I have lost two fingers on my right hand. I have had several bones in my neck fused and have had some hip problems.

About 9 years ago I experienced a stroke which paralyzed my left side, and I learned to walk again, but still I cannot use my left arm and hand.

When I was released from the rehabilitation hospital following my stroke, I had to think about how my life might change. I saw myself as a farmer and wanted to stay in farming. Farming was my way of life. It was not just a way of making a living.

My farm has been in the family for 100 years, and I certainly wanted to preserve it for my sons. At that time there was no AgrAbility Project in Nebraska. So I called the State Vocational Rehabilitation Agency for help, and a counselor came out to my farms to look at ways to accommodate my disability.

They provided power steering for a small tractor and secured a speaker phone and other household items to make my life easier, but vocational rehabilitation staff were really clueless about my farm equipment and how to modify it.

It is this kind of a gap, in fact, that triggered the creation of AgrAbility 6 years ago. Farmers with disabilities like myself are falling through the cracks. An estimated 500,000 farmers and ranchers with disabilities were struggling in isolation using homemade, often unsafe modifications to stay in business.

With AgrAbility came practical assistance from people who really understand farming and disability. They recommended making changes to my pneumatic feed system that enabled me to shift feed from one bin to the other without having to climb a ladder.

They looked at the amount of walking that I was doing in my irrigated fields, which are hard to navigate since they are often muddy. They recommended an all terrain vehicle, which is called the Mule, which has 4-wheel drive and safely gets me all over the farm.

AgrAbility staff coordinated the purchase of a feed system, adaptations and a vehicle. The State Vocational Rehabilitation Agency paid for part of the cost to keep me working, and I paid the balance.

AgrAbility is effective because it is a partnership between a State Cooperative Extension Service and one or more nonprofit disability organizations. Currently 19 States are served by AgrAbility Projects, and Extension Service, Easter Seal Society, and Assistive Technology Project, and the Department of Health.

AgrAbility combines the agricultural know-how of the Extension system and the disability expertise of Easter Seals and others to help farmers with disabilities and their families overcome barriers to farming.

AgrAbility mobilizes public and private resources to help farm and ranch families stay in agriculture production or related work.

AgrAbility promotes self-help by providing disabled farmers with information and ideas that are tailored to their unique farm operation and abilities.

Farmers are smart and independent. With a little guidance, they will do what needs to be done to stay farming. AgrAbility helps provide information and linkages that enable neighbors to help neighbors.

Immediately after my stroke, my neighbors planted my fields using a tractor and a disk loaned by the local implement dealership. Another neighbor, who is a crop duster, sprayed for corn borer at no cost to me.

AgrAbility allows neighbors to go one step further, providing blueprints so they can pitch in and help build a ramp for someone using a wheelchair or by working with local machine dealers to order and install hand controls and lifts for tractors or combines.

Federal investment in AgrAbility acts as seed money to encourage private sector support for disabled farmers and ranchers. Grants and donations of equipment, materials, and labor and recruitment of volunteers magnifies the impact of this program.

For example, the Kraft Dairy Foundation has contributed $82,000 over 5 years to help disabled dairy farmers served by the Wisconsin AgrAbility Project. In Ohio, Sears and HQ Home Improvement donated materials for building ramps for AgrAbility clients. In Iowa, ADM donated video equipment to enable staff to carry out remote evaluations. The Dole Foundation funded a mobile unit for making modifications on the farm, and the Kellogg Foundation provided funds to promote the prevention of secondary injuries to farmers.

Farmer organizations and commodity groups are active supporters of AgrAbility. In Michigan, the Farm Bureau employees contributed funds to AgrAbility through the United Way to buy and modify equipment. Illinois' Rotary and Elks members and the Wisconsin Cheesemen donated funds and referred farmers to the program.

Every AgrAbility project coordinates a peer network that involves farmers with disabilities as volunteers. As peer advisors, my friend Bruce Meyer of Ruskin, NE, who is here today, he and I travel across the State to meet farmers to discuss their disabilities, share ideas for ways that they might modify their operations, and offer support to them and their families. Expense that we incur as a result of these activities we pay out of our pockets.

AgrAbility directly helps farmers, ranchers, and—excuse me. You can see it is pretty close to my heart.

Mr. COMBEST. That is fine, Mr. Stauffer. Just take your time.

Mr. STAUFFER. AgrAbility directly helps farmers and ranchers and farm workers with disabilities to succeed in agriculture. No other Federal program provides this specific service.

Please insure that the AgrAbility Program is continued. AgrAbility is a helping hand, not a handout. Tens of thousands of agriculture producers across America could use a hand. Your support is critical.

Thank you.

[The prepared statement of Mr. Stauffer appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much, Mr. Stauffer.

Mr. Rutta, did you have a statement that you wanted to make?

Mr. RUTTA. I have no statement. I am just here to accompany Mr. Stauffer, other than to thank the committee and thank the Extension Service for being such good and interested partners in reaching out to farmers with disabilities across the country.

This program, which in terms of State funding involves about $85,000 of Federal funds coming into any given State, really acts as a catalyst. It mobilizes all sorts of private and public resources to come together and help these farm families, and we work with 4–H and FFA and Farm Bureau, and really all of the entrants that have been represented here today to help farmers stay in the business of farming, and it really is a major bang for the Federal buck.

And Easter Seals is really proud to be a partner with USDA and all the others in the agriculture community to help these disabled farmers stay in farming.

So thank you.

Mr. COMBEST. Thank you very much.

As all of you are aware, we continue to have challenges in dealing with Federal budget, which is becoming tighter and tighter, and as we do that, we will continually be faced with a challenge of trying to make certain that the services that are essential through USDA and through research and Extension and education are spent in the proper form and in the proper manner.

I would like to ask each of you if you would comment on whether or not you feel that we would be able to or should continue the urban Extension activities at the expense of rural and traditional agricultural Extension activities.

Let's start with you, Dr. Robinson.

Mr. ROBINSON. Thank you, Mr. Chairman.

That is a very tough question that you lead with. Perhaps I could respond in two ways.

One, if one looks at the program funds that are going to agriculture and natural resources, that is still the majority of the programming. The States which provide roughly 70 to 73 percent of the total funding for extension have many demands on their program. Many of those are in urban areas, and it is, I think, somewhat important that the Federal partner at least be aware of those.

The States are going to move funds to a number of different programs, depending on what the State issues are. In terms of looking ahead for programming for Agricultural Extension, I think that the leverage that the Federal dollar and the Federal partner gets in partnering with the universities and others that you see represented here has been very significant to promote agriculture in this country.

Mr. CRABB. I think as Dr. Robinson has pointed out, there are a lot of pressing needs in each of the States that represent uniqueness in program delivery in each State.

In California, as Dr. Robinson pointed out, the majority of our funds are still focused on traditional production agriculture areas and dealing with problems that are very closely related to agriculture, whether it is air quality, or topics that are going to be issues that will impact the sustainability of agriculture in California.

What we have done in many cases is, as we look at these other opportunities, for example, work in urban areas and urban garden projects we have tried to think about how to work smarter. We have made, I think, excellent use of volunteer networks so that, in fact, our advisors continue focused on the high order educational activities, and that we develop a cadre of people that work with the University of California to deliver programs to a broader cross-section of the community, thus leveraging even further the investment that is made by the Federal, State, and local Governments, and bringing a lot of quality program effort to people in the urban areas without necessarily focusing a lot of fully funded people in those projects.

Mr. LAMBERT. Mr. Chairman, we have a difficult time denying requests for information or for support in certain program areas, and one of the ways that we are getting into the urban environment now is with the green industry. It is the fastest growing segment of our economy, our agricultural economy, with about $1 billion annually spent on production, maintenance, installation of ornamentals, turf, and that sort of thing in our metropolitan areas.

But the justification, we feel, is that it is a logical extension of what we do in the College of Agriculture, and it is also an industry that has its roots or its base in the rural counties. That is where the production is. It is only the installation and maintenance that is done in the metropolitan areas.

So this is sort of a logical extension of what we do in the College of Agriculture and in Extension.

Mr. ELLIS. I think you have got a difficult situation, and I do not think you can be all things to all people, but, on the other hand, you want to help in any place and anywhere you can and reach more people.

So I guess any comments that I would make would be personal opinions. I know that in our county, that the agricultural base of the farmers provides much in the way of taxes, in property taxes for the county system, and it takes a lot of tax money to develop new development in the cities, and so they are getting already in tax development streets and new infrastructure developed for new development around the cities, and it is a difficult situation for you, I am sure, to be cut back in funding and want to meet all people's expectations and needs.

And so I can feel for your situation, but I have no real solution.

Mr. RUTTA. I would just say for the AgrAbility Program we found Extension to be a very good partner really in all areas, whether it is cities, suburban areas, or moving out into the countryside. The project was created because the infrastructure had so many gaps for disabilities in the more rural areas, in the remote areas, so that that is really where our emphasis has been, and that is where I expect it would continue to be.

Mr. COMBEST. Mr. Dooley.

Mr. DOOLEY. Yes, I would like to go in a little bit different direction for this hearing, and it really gets to the funding of the Extension Services, and I guess, Dr. Robinson, you have made a fairly general statement that of the Extension activities, about 70 percent is State and local and private, and 30 percent is Federal.

Mr. ROBINSON. Yes, Mr. Dooley. Actually it is a little less than 30 percent Federal on the average. It does vary. You just heard the California figure is more like 19 percent, I think.

Mr. DOOLEY. Do you know off the top of your head what would be like a high and low for the continental United States?

Mr. ROBINSON. I do not have that off the top of my head, but I can give you in the 1890 institutions, for example, the Federal funding is primarily the source of funding for Extension activities. In some of the larger universities and the larger States, it is more in the neighborhood of 15, 18, 20 percent.

Mr. DOOLEY. Can the Department provide the committee?

Mr. ROBINSON. Surely.

Mr. DOOLEY. Do you have access to those?

Mr. ROBINSON. We do.

Mr. DOOLEY. I would like a State-by-State breakdown in terms of what is the Federal contribution and the local and State match.

Mr. ROBINSON. I surely do, Mr. Dooley, and had also agreed to visit with you in our last session. I think we are scheduled next Tuesday to talk about some of these issues in fund.

[The information follows:]

SOURCES OF FUNDS ALLOCATED FOR COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
EXTENSION PROGRAMS
FISCAL YEAR 1995 (Dollars In Thousands)

		EXTENSION FEDERAL FUNDING								
STATE	GRAND TOTAL	3(B)(C)	%	3(D) OTHER	OTHER FEDERAL ADMIN	1890 FUNDING	1890 OTHER	TOTAL FEDERAL FUNDS	%	ESTIMATED NON FEDERAL FUNDS
ALABAMA										
AUBURN	30,601	6,042	19.7	2,722				8,764	28.6	21,837
TUSKEGEE	1,708					1,708		1,708	100.0	
ALABAMA A&M	1,709					1,709		1,709	100.0	
ALASKA	5,007	1,017	20.3	806				1,823	36.4	3,184
AMER SAMOA	684	338	50.0	161				500	50.2	200
ARIZONA	12,230	2,082	17.0	2,001				4,083	33.4	8,147
ARKANSAS										
UA - FAYETTEVILLE	28,329	5,033	18.2	2,358	273			8,281	28.2	21,068
UA - PINE BLUFF	1,587					1,587		1,587	100.0	
CALIFORNIA	67,221	6,785	10.1	4,667				11,451	17.0	55,770
COLORADO	20,475	2,837	13.9	1,137				3,975	19.4	16,500
CONNECTICUT	6,035	1,885	31.3	1,300				3,185	52.8	2,850
DELAWARE										
UNIV OF DELAWARE	4,648	1,123	24.2	740				1,863	40.1	2,785
DELAWARE STATE	742					742		742	100.0	
DC	2,081	982	47.2	0				982	47.2	1,099
FLORIDA										
UNIV OF FLORIDA	50,694	4,732	9.3	3,145				7,877	15.5	42,817
FLORIDA A&M	1,501					1,501		1,501	100.0	
GEORGIA										
UNIV OF GEORGIA	57,482	7,522	13.1	2,810				10,332	18.0	47,150
FORT VALLEY STATE	2,139					2,014	125	2,139	100.0	
THE NATL FACULTY	3,721				3,721			3,721	100.0	
CTR FOR REHAB TECH	231				231			231	100.0	
GUAM	3,224	905	28.0	298				1,203	37.3	2,021
HAWAII	5,492	1,177	21.4	593				1,770	32.2	3,722
IDAHO	14,142	2,658	18.8	1,150				3,808	26.9	10,334
ILLINOIS	41,283	8,940	21.7	2,842				11,782	28.5	29,501
INDIANA										
PURDUE UNIV	35,939	8,029	22.3	2,276				10,305	28.7	25,634
INDIANA UNIV	228				228			228	100.0	
IOWA	46,625	8,837	19.0	2,631	317			11,785	25.3	34,840
KANSAS	38,825	5,506	14.2	1,284				6,790	17.4	32,035
KENTUCKY										
UNIV OF KENTUCKY	46,270	8,706	18.8	2,423				11,129	24.1	35,141
KENTUCKY STATE	2,481					2,456	25	2,481	100.0	
LOUISIANA										
LOUISIANA STATE	29,740	5,062	17.1	2,653				7,715	25.9	22,025
SOUTHERN UNIV	1,936					1,463	473	1,936	100.0	
MAINE	7,610	2,019	26.5	1,381				3,400	44.7	4,210
MARYLAND										
UNIV OF MARYLAND	22,359	3,222	14.4	1,286				4,508	20.2	17,851
UNIV OF MD E. SHORE	1,181					1,181		1,181	100.0	
MASS	7,409	2,381	32.2	1,403				3,784	51.1	3,625
MICHIGAN	47,085	8,229	17.5	2,869				11,098	23.6	35,987
MICRONESIA	1,420	669	47.1	132				801	56.4	619
MINNESOTA	48,020	8,884	18.5	2,845				11,729	24.4	36,291
MISSISSIPPI										
MS STATE UNIV	33,385	6,712	20.1	4,299	156			11,167	33.4	22,218
ALCORN STATE	1,882					1,882		1,882	100.0	
MISSOURI										
UNIV OF MISSOURI	34,504	7,851	22.8	3,399				11,250	32.6	23,254
LINCOLN UNIV	2,455					2,454	1	2,455	100.0	
MONTANA	10,844	2,359	21.7	1,244				3,603	33.2	7,241
NEBRASKA	33,181	5,850	18.0	1,359	311			7,384	22.3	25,797
NEVADA	10,041	1,067	10.6	752				1,819	18.1	8,222
N HAMPSHIRE	7,704	1,478	19.2	610				2,088	27.1	5,616
NEW JERSEY	16,516	2,518	15.2	1,495				4,013	24.3	12,503
NEW MEXICO	13,146	2,256	17.2	1,081	396			3,733	28.4	9,413
NEW YORK										
CORNELL UNIV	71,487	9,501	12.8	4,231				13,732	18.8	57,755
NY STATE UNIV	189				189			189	100.0	
N CAROLINA										
NC STATE UNIV	66,054	11,208	17.0	4,787				15,995	24.2	50,059
NC A&T STATE UNIV	2,855					2,848	7	2,855	100.0	
N DAKOTA	13,358	3,186	23.9	1,012				4,198	31.4	9,160
N MARIANAS	961	526	54.7	185				711	74.0	250
OHIO	47,575	9,268	19.5	3,454	316			13,038	27.4	34,537
OKLAHOMA										
OK STATE UNIV	28,327	5,138	18.1	2,000	156			7,294	25.8	21,033
LANGSTON UNIV	1,574					1,574		1,574	100.0	
RURAL ENTERPRISES	284				284			284	100.0	

SOURCES OF FUNDS ALLOCATED FOR COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
EXTENSION PROGRAMS
FISCAL YEAR 1996 (Dollars in Thousands)

STATE	GRAND TOTAL	EXTENSION FEDERAL FUNDING 3(B) (C)	%	1862 OTHER	OTHER FEDERAL ADMIN	1890 FUNDING	1890 OTHER	TOTAL FEDERAL FUNDS	%	ESTIMATED NON-FEDERAL FUNDS
OREGON	23,105	3,665	15.9	1,378				5,043	21.8	18,062
PENNA	33,068	9,179	27.8	3,699				12,878	38.9	20,190
PUERTO RICO	17,331	6,335	36.5	1,884				8,219	47.4	9,112
RHODE ISLAND	2,840	818	31.2	1,042				1,860	65.5	981
S. CAROLINA										
CLEMSON UNIV	30,480	5,495	18.0	2,109				7,604	24.9	22,876
SC STATE UNIV	1,535					1,535		1,535	100.0	
S. DAKOTA	12,077	3,189	26.4	1,290				4,479	37.1	7,598
TENNESSEE										
UNIV OF TENN	39,214	8,877	22.6	2,811				11,688	29.8	27,526
TENN STATE UNIV	2,222					2,222		2,222	100.0	
TEXAS										
TEXAS A&M	63,389	12,171	19.2	5,651				17,822	28.1	45,567
PRAIRIE VIEW A&M	2,911					2,911		2,911	100.0	
UTAH	12,541	1,632	13.0	1,264				2,897	23.1	9,651
VERMONT	7,104	1,509	21.2	1,193				3,485	49.1	3,619
V. ISLANDS	1,479	784	53.0	137				921	62.3	558
VIRGINIA										
VA TECH	41,035	7,014	17.1	2,799				9,813	23.9	31,222
VA STATE UNIV	1,922					1,922		1,922	100.0	
WASHINGTON	25,150	3,984	15.8	1,380				5,364	21.3	19,786
W. VIRGINIA	8,681	3,791	43.6	1,271				5,181	59.6	3,500
WISCONSIN	49,484	8,026	16.2	2,118	150			10,298	20.8	39,189
WYOMING	7,531	1,404	18.6	591				1,995	26.5	5,536
SUBTOTAL	1,482,811	281,481		110,812	8,880	31,651	819	410,970		1,071,848
FEDERAL ADMIN	16,780							16,780		
TOTAL	1,499,591							427,750		

Mr. DOOLEY. Perhaps, Dr. Lambert, in Georgia do you happen to know the figures in terms of what is the Federal versus State and local?

Mr. LAMBERT. In Extension budget, I believe it is about 18 percent Federal.

Mr. DOOLEY. Eighteen percent Federal, and do you know what percent is State funded and local funded and private funded?

Mr. LAMBERT. A little over 60 percent is State funded. We have county contributions to the overall Extension budget and also gifts and grants.

Mr. DOOLEY. OK.

Mr. LAMBERT. The county contribution is just slightly less than the Federal contribution.

Mr. DOOLEY. I guess, Dr. Robinson, going back to you, you know, when I do a little bit of an analysis of the Smith-Lever Act funding, the No. 1 State is Texas, which you would assume that it would be very high being the No. 2 agricultural State in the Nation in terms of gross receipts. But the second highest is North Carolina, which my figures show that it receives about $18.9 million in Smith-Lever funds. And yet it has an agricultural production of $6.5 billion, and that compares, again, with the State I am most familiar with, my home State, California, which received about $11.4 million, and that, again, is compared to the $18.8 million from North Carolina.

And yet whereas we have $22 billion in agriculture production, North Carolina has 6.5. You know, from just a layman's analysis of this, you know, how does the Department justify this?

Mr. ROBINSON. The Department actually distributes money under the formula base, which is Smith-Lever B and C according to congressionally determined statutory formulas. Those formulas have components that deal with both farm population and rural population.

For example, under Smith-Lever B and C, 20 percent of the formula funds are equally distributed among all the States. Forty percent is based on farm population, and 40 percent is based on rural population.

Mr. DOOLEY. Dr. Lambert, I guess maybe I would like to hear your rationale where we have Georgia, which is No. 3 in its ranking in terms of receiving Smith-Lever funds, which as I have, my figure show $16.5 billion, and these are 1996 figures. Yet Georgia's agriculture production, and again, this is 1995–96 figures, I think was $4.6 billion.

You know, how do you convince me that if I am making a Federal investment in order to further agricultural research and the utilization of agriculture research, kind of the goals of our Cooperative Extension Program, where we are investing, you know, $16.4 billion in Georgia which has an agriculture production of 4.6 and, again, in California we are only investing 11.4, yet we have got $22 billion in agriculture production; how do you convince me that this formula is in the best interest of the national objectives in terms of advancing agriculture's interest?

Mr. LAMBERT. Mr. Dooley, Georgia, like California, is a very diverse State. We have a lot of different agricultural enterprises, and we are in sort of a state of transition right now in Georgia, too, where our agriculture is changing almost on an annual basis.

As I indicated in my earlier testimony, we have gone from less than 200,000 acres of cotton in the early 1980's to 1.5 million. So we have to have a large base of expertise in place to try to accommodate these changes and to meet the changing needs that we see in the State.

Another factor that, I guess, complicates the situation for us is that we have 159 counties. So we have to maintain a county office in all oft hose 159 counties. That is the political expedient that we have to deal with on a State basis, and so that is also an expensive proposition to us.

But the figures that you use do not exactly agree with the figures that I had, which was about $10.8 million of Federal funding this past year, but I will not argue those figures with you.

Mr. DOOLEY. I guess, then, just before we leave this, and I will wait for another round 2, I guess from a Federal perspective, if we are making an investment of Federal dollars to advance agricultural research, why should we care that you have 151 counties? You know, shouldn't it be more of a function in terms of, you know, I will make an investment of dollars in order to get the greatest return to the agriculture industry as a whole.

Now, if I have States that have a whole lot of counties out there, which is elevating the overhead, then that investment of Federal dollars I am getting is going to show a lot less return. You know, from a Federal Government perspective, you know, why shouldn't I be asking Georgia basically to be showing a fairly similar rate of return on the investment of Federal dollars that I am asking other States? Why should I be concerned that you have 151 counties? You have got an infrastructure that is out of control.

Mr. LAMBERT. It should not be your concern, but it is our concern. It is something we have to deal with on a daily basis.

As far as the agriculture income, that is increasing in our State, and we have these dynamic situations that we have to deal with, and it requires a higher level of expertise in place to do that.

Mr. DOOLEY. Thank you.

Mr. COMBEST. Mr. Chambliss.

Mr. CHAMBLISS. I think the answer is we need to quit sharing our research information with California, Bill. We need to just keep it in State. They started growing our peaches, our cotton, our pecans out there, and I think that is the answer to it, Cal.

You know, we receive information, I am sure, that is done in North Carolina on tobacco, for example, and I hope we are sharing this information all across the country, and I do not know that there could be any cause for concern about a direct relationship with those monies, but it is a good point.

I want to go back, Dr. Lambert, to something that Mr. Combest was talking about, and that is this rural versus urban situation. I know we have had some concern and some negative reaction about Extension offices located in urban areas, about ASCS offices located in urban areas, and I am sure that every other State has encountered the same problem.

What percentage of our programs, in addition to the two that you particularly talked about, are directly related to production agriculture? And how do these programs benefit the rural community? And, also, what percent of our programs are urban oriented, and what do our production agriculture folks think about our participating in programs that are strictly for urban areas?

Mr. LAMBERT. Well, that was a long question. Most of the programs in Georgia obviously are oriented towards production agriculture or issues that directly impact production agriculture, as the water issue that I talked about in my testimony in southeast Georgia, because it is an environmental issue. It is a natural resource issue, but it is one that directly impacts agriculture because it is the water source for irrigation in that part of the State.

In the last several years, we have changed administrations in the college, and we have had a dean that is refocusing our efforts on agriculture. So the vast majority of our programs now are directly in line with our college's mission of agriculture and environmental science.

As far as the programs that we continue to do outside of rural areas that I mentioned earlier with the green industry, it is an industry that is spread over the entire State. It benefits rural areas as much as it does the metropolitan areas.

Like Dr. Crabb said in California, Georgia has used that same model as far as delivering horticultural information to consumers in metropolitan areas using volunteers through the Master Gardener Program.

It has been a very efficient use of funds where we supply several hours of intensive training at a high level to volunteers, to Master Gardeners, and they, in turn, agree to return many times more hours to us to answer consumer questions. So it has been an excellent investment in time.

The final part of the question, what do the rural interests think about our involvement in urban areas? In the case of the green industry, obviously they support it because they are producing turf; they are producing ornamentals and containers that are shipped to the metropolitan areas.

The areas that we have been most criticized for are programs that we have been involved in in the social arena, and our college has tried to divorce itself from some of that by moving those programs into the College of Family and Consumer Science, which is outside the College of Agriculture and Environmental Sciences.

So that programming is where it should be with its research base, and we continue to deliver some of those programs through our Extension offices, but we have limited that amount of program.

Mr. CHAMBLISS. Thank you.

I want to get into in the next round a little more detail on what I am about to ask about, particularly with Mr. Ellis because I think he has hit on an issue that is right on target, but, again, Bill, in your testimony you mention that horticulture agents are going to be networked electronically to develop a database across the State.

What kind of information is going to be networked and what is the importance of that type of technology to folks involved in agriculture?

Mr. LAMBERT. Well, the newer means of communicating information electronically make us more efficient. We can expand delivery of information in the metropolitan areas, for example, by creating

Web pages that we do not have to have people doing it. So it is a fairly economical way to do it.

Using the volunteers that I mentioned from Master Gardeners we are developing a database that they can use to answer consumer questions, and this can be used anywhere in the State. I mean it is designed to decrease the work load in the urban areas, but it can also be used in any of the rural counties to answer consumer questions.

One of the most exciting things that we are doing right now, we have just received funding through a private foundation to enable us to set up a distance diagnostics network in the State where we are putting new computers, microscopes, and digital cameras in 30 counties strategically located around the State, and these will be places that farmers can bring plant material, insects, whatever, to the county offices, have images taken of them. If the county agent is not familiar with it, they can transmit it back to our laboratories on campus and have some of the scientists there look at it and give immediate responses as far as identifications and control recommendations if that is needed.

This is the first year of the program. We intend to expand that program. In other years, we are looking at a commitment of about $1.8 million to develop this network, and I think we will see this expand considerably in the future. It is just a better way to do business.

Mr. COMBEST. Mr. Lewis.

Mr. LEWIS. Yes. Mr. Ellis, I wonder if you would share with us some of the things that you are doing with the University of Kentucky, Department of Agriculture in precision agriculture research and how it is benefitting you on your farm.

Mr. ELLIS. We got into the precision agriculture with the university as a result of a water quality study that we had participated in for 3 years, and the findings there were that the triazine levels 1 month after application were up near the limit allowable for drinking water.

So through this research, we are learning how to control the triazine levels, and they are doing water movements through the soil and finding out how much triazines are moving through the soils into the groundwater, how much runoff, what the triazine levels are in the water that are going down the streams.

We are set up to take measurements every so often automatically, where they are sampling the water flow coming off of our farms, off of our fields. They are going to be using this technology to control the sprayers as I alluded to earlier, to only put the triazines away from the streams, away from the water inlets into the groundwater.

They are doing population studies where they are varying the population and using the GPS technology (1) to sample the soils, (2) to also then harvest and record the yield on the combines, and so basically using the combine technology or the yield monitoring technology, we are able to turn basically the whole farm into a research station.

We can determine that there are differences in soil types, differences in nitrogen applications, differences in herbicides, differences in varieties, and we do not really fully have the breadth of what all we are going to find using this technology, but it is just really exciting to be involved in that.

Dr. Schearer, who is accompanying me here, is doing much of the research on the farm, and he might want to comment if the committee would allow it.

Mr. COMBEST. We would be happy to have him if he has some comments to make.

If you would, for the record, please give us your name.

Mr. SHEARER. My name is Scott Schearer. I am with the University of Kentucky in the capacity of a researcher in Lexington.

The thing that we have found is that as we move into the area of research in site specific agriculture or precision agriculture, we are needing to move from test plots on university research farms into a whole farm type scenario.

By partnering with people like Mike Ellis, it has done two things as far as our research programs go. It has expanded the opportunities that we have to conduct this research, and more importantly, it has also helped us to focus on what is important in the production scenario with respect to Mike Ellis and his problems.

This relationship has been very beneficial, and it is now beginning to spill over to other farmers within the county that Mike farms in. So we are seeing, I guess, effects that extend well beyond just the partnership that Mike Ellis has with the university at this point in time.

Thank you.

Mr. ELLIS. I would make a couple of other comments of benefits that I am seeing. It is exciting to be in a partnership. The funds that you give to research, there needs to be an accountability. I am sure you are wanting to be good stewards of the money, and in his projects, he has sought my counsel and also that of industry. So it is a joint effort between industry and the university and the farm, and we are working together.

And then like he was alluding to, we are disseminating that information out, but you have three people there that are accountable for the monies that are given to research.

I have a vested interest. I want to see that the research is done in a way that is really going to benefit the farmer, and particularly myself.

The research also is showing that we do not necessarily have to use as much fertilizer as we once thought. If we take more samples, then we find out that the universities are making a blanket recommendation for the whole State of Kentucky. That is bottom ground; that is river bottoms. Kentucky just has quite a bit of difference in typography and soil types. Our farm only has four different soil types. So we are finding that they are recommending 50 percent more than what is really required just to make sure that they cover the variability.

Because we can take one soil test here and another a foot over, and it is almost entirely different, and they want to make sure they have enough to cover it. So the thought is now that if we take more samples, then we are going to have a more accurate reading. Therefore, we can reduce that amount of fertilizer input.

And then with nitrogen application, Dr. Schearer is just starting into that research and using the soil doctor technology, and the thought there is that if we have a crop model, this year we had a lot of rains early. We are already applying our nitrogens late to avoid all of that rainfall which washes all of that nitrogen down the streamlines up and down Louisiana in the gulf, and then we have a dead zone down there that will not grow any fish. We do not want that to be happening on the Ellis farm. We do not want it to go down the Ohio River.

So we are looking at that, and then how do we develop a crop model that only puts on the nitrogen that is really needed for the remainder of the season for that particular variety, and so it is going to open up new avenues there in reduction and more efficient use and keeping us competitive really in the world markets in grain production in this country.

Mr. LEWIS. Thank you. I appreciate that.

Thanks.

Mr. COMBEST. Mr. Stauffer, I had a question. Actually, Mr. Rutta, it might be something on a national level that you would be able to address better, but in terms of the assistance through the AgrAbility Program, have you looked at or what would your thinking be in terms of a national grant program that would affect all disabled Americans so that you looked at it in terms of a broad base and the applicability of what might be benefitted from that rather than more profession-specific?

Would there be, for example, benefits that the AgrAbility is providing for disabled farmers that also might have application that would affect people in other types of industry that would be able to benefit from the same technology, be it a tractor or whatever the case may be?

Have you looked at that in terms of this being on a national basis rather than more of a profession specific basis?

Mr. RUTTA. We certainly did. In fact, the genesis for this program came from the gap that happened to occur around agriculture because really there is in the Department of Education the Office of Vocation Rehabilitation, and then there are Department of Labor programs that really relate to disability and work and do cover really the broad spectrum of career activities.

Mr. COMBEST. But there was a cap in agriculture?

Mr. RUTTA. But those programs were not getting to the agricultural community, and that is really where this program came about, and the reason being that either the people in those other programs did not have the agricultural expertise or the background or the programs tended to be more city based or based where they are the greatest population, and you know, for those reasons the farmer was losing out.

And so that why we felt this program never needs to be a big program, but it needs to be just big enough to provide a hook to get that Extension expertise connected to the disability community and then out into the rural community.

Mr. COMBEST. Is it, in your opinion, adequate?

Mr. RUTTA. I think the program as it has been authorized and as we would like to see it reauthorized is adequate, but the funding level, of course, has never come up to the authorization level. So we only have 19 States currently being served every year.

It is a competitive grant process. States' Extension Services find a disability partner. They compete for funding, and in any given year about a dozen applications, meaning a dozen States, put in proposals that are not able to be funded because of lack of funds, and those are States like California, Florida, Texas, Georgia, some pretty significant agricultural States.

So we think that the authority that has been put in place and the way the USDA has implemented it is really quite adequate. We just hope we can get these programs in more States.

Mr. COMBEST. Is there a pretty broad network of volunteers that work within this program? I know in specific instances Mr. Stauffer mentioned certainly there were, but as a national program, do you find that there are a lot of volunteers who are willing to give of their time and expertise in helping to see this program move forward?

Mr. RUTTA. I will mention just from my perspective nationally, and then let John talk about his experience in Nebraska, but it really is a program driven by volunteerism.

There are two ingredients. It is volunteerism, and then the key expertise that really relates to that individual, that farmer, his or her disability, and the farm activity that they are attempting to carry out.

So if you can bring the expertise together with the rural community, that volunteerism is there. For Easter Seals, we have got hundreds of thousands of volunteers involved in our organization, and they have really taken an interest to reaching out to people with disabilities in rural areas, and that is one of the reasons why we are involved in this program.

So they get out there, and whether it is, you know, person power and they help modify a farm building or a home so that someone who now, you know, has a spinal cord injury can get into the house more effectively, to people working with bankers so that they understand that how is a disability now going to perhaps change the financial sheets for that farmer, that they may have had a relationship for a long time with; it is all different ways that people come in as volunteers to support farmers and farm families, but they are there, and that is what I think is most impressive about the program.

Mr. STAUFFER. Yes, I would agree. I was thinking that farmers are quite unique that they are so independent, and for myself, I was kind of offended when Voc. Rehab. said, "Well, we may have to change this or that," on my brand new tractor. I did not like that.

When AgrAbility came, well, Becky, the director, is a farm wife, and she knows what makes a farmer tick, and there is just a world of difference. That is why it is nice to be up here and go and meet with a farmer that you know how he feels. You do not have to tell him. You know, you do not have to have that "I know how bad you're hurting," and all of that stuff. You know, it is just we are on the same level, and I assume that they are probably just as egotistical as I am.

Mr. COMBEST. I was always wanting my father to make some modifications on the tractor I grew up driving, but he never would get that air conditioned cab until after I left. [Laughter.]

Mr. COMBEST. And I never could figure that out.

Mr. Dooley.

Mr. DOOLEY. I want to revisit this funding issue again. The Smith-Lever funds have been frozen, I guess, since 1962, I guess it was, the base amounts, and Dr. Robinson talked about the allocation, what it was based on then.

I guess the thing that I am interested in and what I find encouraging is both Dr. Crabb and Dr. Lambert, you both in terms of the State of California and the State of Georgia, in terms of the Federal dollars, leveraging State, local and private dollars, that you folks are both really close, around the 19, 20 percent level. I think you both are right there.

Again, from a Federal perspective, from a policy perspective, if we are trying to make sure that we are maximizing the investment of this Federal dollar to leverage the private and the State and local funds, should we not be setting some standards out there on Smith-Lever dollars?

Maybe it is not 20 percent, but maybe it is 25, and I would just be interested in your comments in terms of leveraging the State and private dollars.

Mr. LAMBERT. I think it depends on how you want programs driven. If you want programs driven by what people at the user level think they need, I think you have to be somewhat careful about requiring certain matches or whatever, and keeping in mind, too, that Extension programs are educational programs as opposed to service programs. So I think it is legitimate if you are dealing with a greater number of clientele to have more support in an educational program to reach those additional people.

Mr. DOOLEY. Go ahead, Dr. Crabb.

Mr. CRABB. You know, in California we have been spending a lot of time and energy on how to utilize our limited resources and how to leverage those as far as we can, and so the model of looking for partnerships just makes a lot of sense to us.

One of the things that is also real clear is that there is a wide variety of needs out there. I mean, the difference between California agriculture and agriculture in some parts of the country where the major commodities can be counted on one hand reflect some real challenges in terms of establishing Federal policy that does not use too wide of a brush, that allows for the unique nature of the individual States to be recognized.

But, you know, from our perspective, without the partnership we would not be able to maintain what we think is a viable program and what we believe is reasonably responsive to the industry needs, and so, it is just natural for us because it is the way we have been doing business for a while now.

Mr. DOOLEY. Dr. Lambert, could you clarify for me? I did not quite understand. Did you say that you were concerned that we should not have a requirement of a match? Is that what you said?

Mr. LAMBERT. My concern is how you require the match, I guess. If you set certain project objectives, and these are the requirements of Federal funding, if those requirements do not match what is needed in the States, I am not sure that we would necessarily want to follow those guidelines.

In other words, it would be easier to let the program demands come from the States up and give us more latitude as to how we leverage or how we form the partnerships Dr. Crabb talked about.

Mr. DOOLEY. Yes. So how is that inconsistent though? As a policy in terms of the Federal funding, if we say we will provide *X* dollars of Federal funding to achieve whatever educational needs the State of Georgia desires, but we also expect the State of Georgia and the local and private interests to put up a match that is not inconsistent with what you are saying?

Mr. LAMBERT. Oh, no, no.

Mr. DOOLEY. Dr. Robinson, you wanted to make a comment.

Mr. ROBINSON. Yes. Let me start, if I may, Congressman Dooley, with the match issue because in Smith-Lever it has a dollar-for-dollar match in each State.

Mr. DOOLEY. But you need to clarify that. That is after the 1962 freeze, right?

Mr. ROBINSON. Yes, it is dollar-for-dollar match for all the funds appropriated above the 1962 base.

Now, if I might, Congressman, get back to an issue you raised a moment ago because it relates to the question you have posed to me a couple of times and, I think, to these two gentlemen.

The underlying basis for the formula is a distribution based on rural population, farm population, and it is not in the current formula, which does not mean it should not be, related perhaps to the level of production, the dollar value of production of a State. It is a matter of looking at those criteria.

When they were originally set up, they were set up assuming that there should be some distribution of funds that went broadly to rural residents and to farm population generally as opposed just to going to a specific level of production or value of production.

Let me give you an example of that. If I look at the distribution. About 35 percent of the funds go to agriculture competitiveness and profitability, fairly clearly identified. About 11 percent of them roughly go to natural resources and environmental management, and there is always a little crossover between those two areas, just as these gentlemen have been talking through programs, because farmers have a great deal of concern in natural resource areas.

About 10 percent goes to nutrition and diet, and then about 18 percent to 4–H and youth development programs. Now, those programs are in every State, for example, in Georgia and are programs that are part of that ongoing program or California program or any other State, and that is perhaps where the rural population issue comes into play.

There is about 12 percent that goes to family development and resource management, some of those broader programs we spoke of, and then about 6 percent to community resource and economic development programs.

So it is an attempt, and it is not real specific or real clear-cut because there are a lot of merging of those programs that are delivered ultimately to counties and to people who want them, but it looks at a broad base of the purposes that Extension was originally created to serve.

I think everyone would suggest that there is always a reason to reexamine formulas when they are old and see what they are doing and see what they are contributing to and how they are reaching the national goals and objectives that you identify.

Mr. DOOLEY. What is your definition of the farm population? I mean, we have USDA using figures in terms of definition of a farm that actually includes the 1.8 million. Around 1.5 million have gross farm incomes less than $50,000 a year.

Some of us, you know, would question whether or not that is actually a farm, and so when I hear 40 percent based on farm population, 40 percent based on rural population, what are your definitions?

Mr. ROBINSON. Well, the definition is the one specified, which is the Census definition, and the Census definition is anything over $1,000 in gross receipts.

Again, I did not set them, Congressman. I only administer them. [Laughter.]

Mr. COMBEST. Mr. Chambliss.

Mr. CHAMBLISS. Let me expand on something Cal is talking about there because I think this is an extremely important issue, and it is a problem that is mutual to you all in the research field, Extension field or wherever, and with us in trying to allocate dollars, and that is how we are going to get the best bang for that limited buck that is coming down the road, and obviously what we need to concern ourselves with is what is the problem that the grower is having that we need to deal with and how do you do that.

And in answering that, I wonder, too, about this sharing of information across State lines and regional lines and crop lines. With our tomato wilt virus problem we have got now, Bill, if California does not have it, it is coming. If Alabama does not have it, it is coming.

So we need to be sharing information on that, but at the same time, we do not need all 50 States working on one problem. Could you comment on that and tell me what your thoughts are about how we handle that problem long range down the road?

Mr. LAMBERT. Well, in most of our commodities, we have regional groups that meet on a regular basis to discuss problems that each of the States are seeing, and the groups do a pretty good job of coordinating who's going to do different phases of the research, what types of research are needed. Most of the groups have Extension representatives attend to help guide what they are seeing in the field so that the research is going to be targeted. It is something that will be workable, you know, for the growers once the research is done and the technology is developed.

I think at the national commodities meetings these problems they are talking about. So things that actually develop as national problems and ultimately national priorities are looked at on a national basis, and I think the mechanism for coordinating these efforts is in place right now. I think we're doing a pretty good job of it.

Mr. CHAMBLISS. Dr. Crabb?

Mr. CRABB. I agree. I think in large part the professionals involved in research and Extension have developed really a well-defined network where they do share information and where they do get together and come up with strategies on how to disperse the responsibility for research and Extension programs.

One of the unique things is that there isn't a State out there that has enough resources that they can go it alone, and so we're always anxious to work with our neighboring States or even across the country on issues that have some common value to multiple States.

One of the pieces that is really critical though is to remember that the Extension program works well because it localizes the information. You might have a body of research knowledge that tells a grower to do X, Y, or Z. However, when you bring it to that local condition, much like Mr. Ellis has talked about, you need to modify that or adapt it to those local conditions, and that's really the strength of the Extension Program, is the ability to localize the research information to the farm, to the particular area of the State or particular area of the country, depending on the commonality of the issues.

And so having the ability to share ideas, to partition research activities, and then to move that information into the Extension conduit is really powerful, and having the Extension conduit move information back to the research core of the universities so that the right research is being done to solve the next round of issues that are going to be facing those growers.

Mr. CHAMBLISS. Mr. Ellis?

Mr. ELLIS. As a small grain grower promotion member, we have been faced with the same situation that you are faced with, and we have check-off funds, and what we have done is ask for different States to submit to us what research they are doing, and in some cases we have supported other States doing research.

For example, Virginia has an excellent barley breeding program, and a gentleman there that is very well up on the genetics of barley, and so we have helped fund their project rather than fund in-State projects, but now that does not happen without a concerted effort.

I do not know how the Extension is structured, but without bringing together the different States to identify problems and even possibly have on that panel farmers to tell, "Here is our main problem and how do we solve that? And who has already an expertise?" We do not want to have to buy new equipment to do research that already is in place from some other project that has been done.

So that fellow might be maybe somebody in Tennessee or Arkansas, who would be a better position to do that research. So we are kind of faced with the same sorts of things.

Mr. ROBINSON. Mr. Chambliss, if I could add just one point to that, it also relates in Extension to what Extension creates in terms of what it calls national initiatives. These involve participation by a number of States, often all States to some degree or another, to insure that there isn't a replication of that information in every location, but that information is shared, and what California may specialize in can be utilized in other places or Georgia and Kentucky and so forth.

It is an effort to really focus on ways to put resources together nationally to address a specific issue. Managing change is an example of trying to leverage resources among States, along with the Federal resources, to begin to look at how to address specific issues of change: risk, risk management, changing markets, changes in

Government programs that farmers are facing—an enormous difference in the environment in which farmers are making decisions.

Mr. **ELLIS**. One other thing that is kind of happening here at the farm level is that we are bypassing a lot of times the County Agent. We are going straight to the specialist that we want to ask like a soil scientist.

The Internet, we are using it more and more on our farm operation. We are using it between the colleges. It is just much more efficient than playing phone tag and having the specialist out in the field when I call him. I leave him a phone message, and then he calls out, and I am out in the field, but with the Internet, I can just type my question in, and I have had farmers coming to me now that we have the Internet and have had for a couple of years now, and I have asked the specialists questions for them and gotten responses and given it to them, and now those neighbors are on the Internet.

But if I want to know a particular thing or a particular research, then I go to that person. The University of Kentucky has put their research on the Internet. I had a farmer friend that wanted to put out a new crop of alfalfa. I just went on the Internet, pulled up the University of Kentucky recommendations for varieties and for the methods of planting and printed that out and gave it to my friend.

So the Internet I can see as a way of disseminating information and getting us in contact with the person that has done that particular research that we have a question of. I have been on the Internet and been into the University of Delaware and back into Purdue and Ohio State just looking up a wheat issue.

So it is just amazing what we can do, the information we can get. The searchability of the Internet just puts us right into the—plugs us into the question that we have.

Mr. **CHAMBLISS**. Mr. Chairman, if you would indulge me for a final comment, I said I wanted to get back to something you alluded to earlier, and that is the precision farming because I think you are absolutely right. That is the direction in which agriculture has got to be going, and you have just answered the question that I was going to ask you about how can we expand that.

You know, for us to be able to pull up some question regarding a problem we are having in Georgia, and we know California has been working on this same problem, for that information to be available for our farmers right there is exactly the direction we need to be going.

And you are right. That is the type of Federal funding that we need to provide, funds that we need to be giving money for to be moving in a direction like that, and I think that is great that you folks are getting that advanced already.

Thank you, Mr. Chairman.

Mr. **COMBEST**. Again, we appreciate everyone being here. We would invite you to submit any additional information that you feel would be pertinent to this series of hearings.

And thank you much and have a good rest of the day.

The hearing is adjourned.

[Whereupon, at 1:10 p.m., the subcommittee was adjourned, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

TESTIMONY DR. WILLIAM R. LAMBERT, ASSISTANT DEAN FOR EXTENSION, COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES, THE UNIVERSITY OF GEORGIA

Mr. Chairman, members of the Committee, thank you for inviting me to participate on this panel this morning. I would like to summarize my remarks now, and submit a more complete statement for the record.

I would like to make several points in my statement to you today. I am sure you agree that cooperation between individuals, groups and organizations is critical to the successful completion of projects. And I want to convey to you that Extension programs are doing that.

It also is important that we have a continuing research and education effort that can deal with opportunities as they arise or problems as they develop. This requires that people be in place, trained in the techniques required to develop and communicate newinformation, with the credibility that only time confers. The Experiment Station and Extension systems have provided this continuity and stability.

I would like to share with you several Extension programs in Georgia that exemplify the technology transfer function of the Extension Service and how they positively impact our clientele.

Georgia's "Green Industry". Georgia is a state in transition, becoming more urban than rural, but still relying on agriculture to lead its economy. In this environment, our College of Agricultural and Environmental Sciences is trying to focus on agriculture and the issues associated with the strengths and resources available in our college. The emerging "Green Industry" is the fastest growing segment of Georgia's agriculture. Ornamentals and turf account for nearly $1 billion in production, sales, installation and maintenance annually. Georgia'sGreen Industry is important across the state with production spread over many rural counties and sales concentrated in the metropolitan areas. To support this industry, our college has ongoing research programs at all of our main campuses and several of our branch experiment stations, as well as Extension teams to deliver new information.

Two new programs show the benefits of partnerships and drawing on existing resources. We are establishing a Center for Urban Agriculture which will be located at our campus at Griffin, 45 minutes from Atlanta, but will draw on people located throughout themetropolitan Atlanta area. Extension horticulture agents are being networked electronically to develop a database that can be shared across the area. Volunteers trained through the Master Gardener program will man telephone banks to answer consumer's horticultural questions using this database, thus freeing professional time todeal with commercial interests.

Another use of technology to extend resources is our Distance Diagnostics Project. Timely identification of disease and insect problems is critical to effective treatment and avoiding losses. In order to make more of the resources of the College available to thepeople of Georgia, Extension is linking county Extension offices with the diagnostic laboratories on the various campuses. Digital imaging equipment is being placed at strategic locations throughout the state so County Agents can transmit pictures of suspected problems to appropriate labs for immediate diagnosis and treatment recommendations. Images will be cataloged and made available on the Extension Web site to assist clientele with future diagnostic questions. This $1.8 million effort is partially funded by a private foundation, but also draws on existing Extension andExperiment Station resources.

Forest Insects And Their Damage Photo CDs: Vol. I & II. Forestry is a major industry in our state with forest lands held by large timber companies as well as by smaller, private landowners who are often farmers. The Extension Service is often called on to help with forest management problems particularly in the pest management arena. Extension faculty in entomology and forestry who recognized the need for having specialized information available in county offices developed a photo CD series. Cooperating scientists from Louisiana State University, Virginia Tech, the U.S. Forest Service provided pictures, information and support for the project. The result was a two volume photo CD containing pictures and information on 2,000 forest insect pests. To date, 700 sets have been shipped to users across the Southeast, other U. S. and Canadian locations and some overseas. The project was completed on a budget of$12,000, and the revenue from sales of the CD's is financing the next volume which will be on diseases of trees.

Ground Water Management. Water quality is a major issue to all citizens of Georgia as well as our sister States and the entire Nation. The Upper Floridan Aquifer is the primary source of drinking and industrial process water in southeast Georgia, as well as the primary source for agricultural irrigation. Recently, concerns over salt water intrusion prompted regulatory action that imposed a moratorium on new or expanded agricultural use of ground water in the region. Georgia's Environmental

Protection Division (EPD) held public meetings to determine the impact of its actions, and Extension was charged with informing the agricultural community about the hearings and their potential impact. As a result of this effort, the agricultural community pointed to the lack of data on water use to support the moratorium, the lack of alternative water sources for irrigation, and the considerable distance of agricultural use from salt water compared to the large municipal users and paper mills immediately on the coast.

Extension subsequently organized an agricultural water use strategy meeting to coordinate all interests affected by the water use issue in the region. Commodity groups, agribusiness, government and the University participated, and as a result, WaterStewards was formed to serve as a clearinghouse for information on water stewardship for Georgia's agricultural community. This group has met with EPD and successfully negotiated a more reasonable course of action. Each affected county will develop a comprehensive water use strategy assisted by Extension, and will institute a water use educational program. Research and Extension scientists will cooperate with WaterStewards and U. S. Geological Survey to monitor agricultural water use to develop a realistic database on which informed decisions can be based.

Georgia's Boll Weevil Eradication Program. The boll weevil has been a major limiting factor in cotton production in many regions of the U.S., and has been a particularly serious pest in Georgia. Lacking natural enemies, the boll weevil required repeated insecticide applications that were costly, disrupted natural enemies of other pests and posed a threat to the environment and man. Georgia cotton growers used over 10 sprays each season to protect their crop from insect pests at a cost of approximately $100 per acre.

Following a successful trial of eradication technology in Virginia and North Carolina in the late 1970's, Georgia cotton farmers indicated an interest in beginning an eradication program. The University of Georgia's Extension Service working with the Georgia Cotton Commission, Georgia Farm Bureau, Georgia Department of Agriculture, National Cotton Council and USDA began a planning process that included a major educational effort. Cotton producershad to be convinced that eradication of the boll weevil was possible, and that the expected cost of $105 per acre to be paid by the grower was a sound investment. The Southeast was suffering hard economic times from a series of droughts and other factors in the early 1980's, and any additional expenses associated with producing a commodity were looked at closely. But, after a successful educational program lead by Extension, a referendum was approved by producers, and an eradication program was initiated in 1987.

During the active phase of the eradication program, several major problems threatened to kill the program including serious secondary pest outbreaks and cost overruns. But perseverance by the program's supporters and trust by farmers allowed solutions to be found which enabled the program to continue.

By 1990, most of Georgia was weevil-free, and the benefits of eradication became apparent. Insecticide use declined steadily each year after the eradication program as producers learned better ways to manage their remaining pests. By the mid-1990's, fewer than three sprays were needed to produce a cotton crop in Georgia. Cost of cotton production was reduced significantly and yields increased. With this improved opportunity for profitability, more farmers turned to cotton, and acreage increased from less than 200,000 in the early 1980's to 1.5 million acres by 1995. It has been estimated that the savings in insecticide use alone accounts for $100,000,000 annually in Georgia.

The eradication of the boll weevil could not have been done without several key factors. The first is the cooperation of the organizations named earlier. Although the funding sources of these groups is varied, their focus on the betterment of Georgia's agriculture is similar.

Second, Extension's long term service to agriculture and the trust in this agency's commitment to farmers brought credibility to the eradication program initially. Later, when additional money was needed to meet unexpected expenses, Extension was able to convince producers of the wisdom of increasing assessments and continuing the program. Research and Extension scientists also were asked to deal with the severe outbreaks of secondary pests encountered during the eradication program.

Finally, ongoing programs in research and Extension were able to provide farmers with technology that enabled them to realize maximum benefits from elimination of the boll weevil. The concept of integrated pest management had been a major educational thrust of Extension prior to eradication, so the adoption of increased reliance on biological control was a logical consequence of eliminating of a key pest such as the boll weevil. Scouting, the practice of monitoring pest and beneficial insect populations to use insecticide inputs judiciously, was well established with Extension sponsored pest management programs used on 85 percent to 93 percent of Georgia'scotton acreage annually.

The boll weevil eradication program success story is a good exampleof the wisdom of having a continuing effort in place that can deal with new opportunities and problems as they arise.

In closing, let me emphasize again the importance of stable funding for people. Our tenure system essentially requires continuing support for faculty positions, but more importantly, continuity in programs demands that we hire competent scientists and county agents and allow them to function in a stable academic or community environment. The boll weevil program and salt water intrusion issue are good examples of opportunities and crises where Extension was able to play critical roles. The credibility of an unbiased, continuing educational program with "nothing to gain" by being involved, allows Extension to bring many players together to address issues.

STATEMENT OF KELLY RATHS

I am Kelly Raths, a 10 year 4-H member from Montana. These ten years of tremendous 4-H experiences have given me confidence, self-esteem, and self- motivation. However, I am not unique, but typical of those youth and families for whom 4-H was a central part of life.

It is an awesome responsibility to be a spokesperson for the 50 million people who have benefited from the 4-H program over its 80-year history, and the 5.4 million boys and girls, kindergarten to 12th grade, who are active in 4-H today.

Even before the passage of the Smith-Lever Act in 1914, 4-H existed as the tomato and corn clubs of the farm and home demonstration program. 4-H has been a continuous and integral part of the Cooperative Extension System ever since, operating under Smith-Lever formula funding.

In the early 1900's 4-H'ers were country kids, then the most deprived part of our society. However, in the early 1970's, the Congress directed 4-H to reach out and meet the needs of urban kids as well. 4-H has done so. Today, 47 percent of 4-H'ers live on farms, in open country, or towns of less than 10,000 population. Fifty-three percent live in bigger towns, suburbs, and inner cities. Nearly twice as many 4-H'ers today live in inner cities as the number who live on farms.

So once again, 4-H programs are reaching out to the part of society that needs it most. Interestingly, the most popular 4-H project areas continue to relate to agricultural and home economics topics. Thus, 4-H is teaching city kids that there is a back door to the grocery store'4-H has always been about a great deal more than just agricultural education. The 4-H pledge I have recited so many times makes that clear:

I pledge my head to clearer thinking,
my heart to greater loyalty,
my hands to larger service,
and my health to better living,
for my club, my community, my country and my world.

On the whole, the racial-ethnic balance of the 4-H program is very close to that of the U.S. population. U.S. Census 1990 data show 80 percent of the population is white, while 74 percent of 4-Hers are white. Twelve percent of the population is African-American, as compared to 16 percent of 4-H participants. Less than one percent of the U.S. population is American Indian, Eskimo, or Aleut, compared to 1.1 percent of 4-H participants. Three percent of the population are Asian or Pacific Islanders, compared to two percent of 4-H participants. And finally, nine percent of the U.S. population are of Hispanic origin, as compared to eight percent of 4-H participants.

The Values and Mission Statement from the current National 4-H Strategic Plan states that 4-H creates supportive environments for culturally diverse youth and adults to reach their fullest potential, and allows individuals to unlock their potential through: active involvement in self-determination of their learning activities; quality hands-on experiences that stimulate skills forliving and lifelong learning; and relationships that empower people to voluntarily help themselves and each other.

All that is true. But we wouldn't have 5.4 million youth involved voluntarily in 4-H if it was not fun! For me and millions of others, 4-H redefined what fun is. I learned that fun doesn't have to involve spending money, high tech equipment or challenging parental limits or the law: Fun came in two forms: the aching of my laughing stomach and the glow of my heart having just done something that made a difference to me and those around me. The best times I ever had in 4-H included working long hours in the 4-H food booth at the fair, cleaning out road ditches, or taking animals to the retirement homes, then listening to the wild childhood recollections of the residents as they held the animals.

Every person is blessed with unique skills and interests and 4-H helps young people to explore these. Like going into a candy shop, and the reaction is the same, youth can experiment in areas of citizenship and civic education; consumer and family sciences; environmental education and natural sciences; healthy lifestyle education; personal development and leadership; plants and animals; and science and technology. About 55 percent of the subject choices 4-H'ers make come from the Biological Sciences; eight percent from the Physical Sciences; 23 percent from the Social Sciences; and 14 percent from the Arts and Humanities.

No matter what 4-H'ers choose to learn, they are building assets that will yield a lifetime of rewards. While I thought I was only learning how to suture a cow, I gained invaluable experience communicating with judges, thinking critically, managing time, and creatively thinking of ways to display what I had learned without using live specimens. Unnoticed at the time, but evident now, I also gained the assets of relating, caring, giving, marketable skills, character, and skills that lead to healthy lifestyle choices.

4-H is the ideal example of public-private partnerships at Federal, State, county and community levels. About 29 percent of Cooperative Extension funding comes from USDA, with the balance coming from States and counties. On average, 20 percent of the total public funding for Cooperative Extension is used in the 4-H youth development program. The total Federal, State and local government contribution to the 4-H program comes to about $280 million annually. Our national private sector partner, the National 4-H Council, and similar State and local 4-H Foundations, bring in roughly $100 million from highly dedicated corporations, foundations and individuals.

We are very thankful for the monetary support that we receive, but 4-H is mostly a volunteer program. By far the largest contribution to the 4-H partnership is the volunteer leadership of 450,000 adult volunteers and 125,000 teen volunteers. The average 4-H volunteer spends about 220 hours a year, drives an average of 400 miles in a personally owned car (more in Montana!), and spends an average of $50 of his or her own money. Using the assigned wage for non- agricultural workers of $12.84 per hour, 4-H volunteers contribute approximately $1.7 billion to the 4-H program each year. That means volunteers contribute cash and in-kind worth $20 for every dollar of Federal appropriations used in 4-H, or $6 for every dollar from Federal, State and county appropriations. It has been estimated that as a national average, it would take eight full-time staff to replace the volunteers supervised by each Extension worker. That would total 32,000 additional paid staff.

So who are these selfless volunteers? Many 4-H volunteers are parents of members or former members. They stay involved not only to witness the awesome molding of their children, but because it strengthens the family. Through 4-H, my parents were able to pass down their heritage, values, and unique skills, as well as take on a few they never knew they had. I, in return, looked into my mother and father's eyes thinking they were the wisest people I knew; so thankful that they were always available and caring.

4-H'ers benefit not only from the knowledge from their parents and other volunteers, but from the research-based 4-H programs from the land-grant universities and USDA. The close connection to the land-grant universities is a uniqueness and strength of 4-H. All 4-H'ers, myself included, rely heavily upon the assistance of the some 4,000 local Extension Agents who are all university staff, trained in youth development.

Because 4-H is also a grass-roots program of county government and local communities, county 4-H Councils include teenaged 4-H'ers who actively guide local program development. Today, in addition to traditional 4-H Clubs, 4-H is playing an important role in school reinvention and reform. Last year almost 3 million youth participated in 4-H school enrichment programs. Most of these hands-on applied sciences are derived from agricultural science disciplines. Popular examples include chick embryology and Environmental Stewardship. The 4-H experiences help kids understand today's world, our food and fiber supply, and help them grow to appreciate and enjoy science. Increasingly, 4-H participants are taught using the 4-H experiential learning cycle of "Do, Reflect, and Appl"; something we've known to work for generations.

Mr. Chairman, I would like to conclude by telling you briefly about an exciting new "4-H Youth Voices and Action" campaign which began last fall with The Ad Council working with National 4-H Council, Extension's private sector partner, our land-grant universities, and counties to recruit youth for community service opportunities. Beginning this fall, the media campaign, 4–H Youth Voices and Action, will involve TV, radio, print, and billboards designed, in part, by 4-H youth. Right now, Rapid Response Teams of 4-H'ers in counties are identifying these service opportunities. As kids see the ads and call the 800 number, 4-H'ers from the caller's community will connect the youth with the various service opportunities identified. 4-H has pledged that this ad campaign will recruit 300,000 new youth volunteers nationwide into service activities.

4-H is very important to me, and I am very proud to be a beneficiary. It is because of 4-H that I am comfortable speaking before you today. As well, I have a family I am proud of and 4-H has established in me a tradition of involvement that I continue today as a Big Sister for the Big Brother/Big Sister Program, a Resident Assistant at my college, and an active member of my church. But please remember, I am not alone or unique in the gifts I have gained through 4-H.

In closing, one of my greatest 4-H experiences was being one of ten people chosen to represent agriculture in a press conference with President Clinton. After introducing myself as a 4-H member, President Clinton said, "If all the youth of the United States were in 4-H we'd have half the problems we do today." I firmly believe that. I know too, with the dedication of those like me, and even you, we can see to it that 4-H touches as many youth as positively as it has me.

STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION

Thank you Mr. Chairman. My name is Linda Reinhardt and I am from Erie, Kansas, in the southwest corner of the State. My husband and I have a small cow/calf operation and raise soybeans and alfalfa. I am Chair of the Farm Bureau Women's Committee and serve on the Board of Directors of the American Farm Bureau Federation. I am here on behalf of the American Farm Bureau Federation to speak in favor of continued funding for a tremendously successful education program, Agriculture in the Classroom.

Agriculture in the Classroom is a systematic program of instruction. The goal of the program is to teach children about the importance of production agriculture so that they will have an understanding of where the food they buy in the supermarket and the clothes they buy in department stores come from, and what it takes to make the finished product. The program reaches children from kindergarten through the twelfth grade.

Agriculture in the Classroom began in 1981 from an idea discussed at a conference sponsored by the U.S. Department of Agriculture. As Chair of the Kansas Farm Bureau Women's Committee at that time, I remember working with other farm organizations and educational leaders in developing the initial Agriculture in the Classroom. As America became more urbanized and the number of producing farmers and ranchers continued to shrink, it soon became apparent that there was an entire generation of children who had little idea of how their food and fiber was produced. Agriculture was and is a vital part of our existence, yet increasingly little was being learned about it. Agriculture in the Classroom was developed to fill this critical educational void, and remains today as the only program teaching this important subject.

Agriculture in the Classroom is not a federally operated program. The program was designed to be run by the individual States for incorporation into their curriculum. USDA's role is to act as a clearinghouse for information and ideas developed by the States for their programs, and also to provide resources and other materials to assist the States in developing accurate and complete curricula. As I leave Washington today, I will join other volunteers and educators at the National Agriculture in the Classroom Conference in New Hampshire to share ideas to strengthen the program.

Agriculture in the Classroom has also benefitted from the support of agricultural organizations like the American Farm Bureau Federation. AFBF has been involved as a supporter of and contributor to the program from the beginning. State and county Farm Bureaus have worked closely with State education officials and local school boards to implement Agriculture in the Classroom in their schools.

While Agriculture in the Classroom has enjoyed the support of organizations like the Farm Bureau, it has retained its own autonomy and identity. We consider it very important that public educational materials not be tied to any particular private trade organization or interest group, and we have strived over the years to maintain our support for the program yet make sure that the program retains its independence. This factor has contributed substantially to the success of the program over the years.

And Agriculture in the Classroom has been tremendously successful. It has been adopted at some level in all 50 States and Puerto Rico. Teachers who have used the program have been very enthusiastic in their praise, and have provided excellent feedback on the continued need for the program in our schools. The program is not limited to textbooks. Many districts have come up with innovative ideas to provide "hands on" learning for urban school students. In Colorado, for example, urban high school students actually live and work on farms and ranches as part of their education. It is this type of cutting edge educational innovation that has made Agriculture in the Classroom such a valuable educational experience for students and teachers alike.

The overwhelming success of Agriculture in the Classroom, it has cost the American taxpayers very little. The USDA part of the program has operated on a limited budget of about $200,000 per year. This amount is almost insignificant when compared to operating budgets of educational programs of other agencies. USDA coordination and technical assistance is a vital part of the program. We would support an increase in funding for the program if it retains its present structure and focus on teaching about production agriculture.

Moreover, Agriculture in the Classroom has never been authorized by Congress. Instead, it has had to rely on the discretion of the Secretary of Agriculture for its funding and vital presence within USDA. This status has cast a cloud of uncertainty over the continued existence of the program, because there is no guarantee that the program will be continued within the Department from one year to the next.

We urge the committee to consider a Congressional authorization for funding the Agriculture in the Classroom program to ensure its continuation as a viable program within the Department of Agriculture. The success of the program speaks for itself. It has demonstrated that it deserves Congressional authorization and a more permanent and certain future within our schools.

Agriculture in the Classroom provides the only chance for many city and suburban students to learn such basic facts as where their food and fiber comes from and how their food and clothing is produced. As our nation becomes increasingly urbanized, the continued existence and funding for Agriculture in the Classroom becomes even more important. The increasingly widespread adoption of Agriculture in the Classroom and the enthusiastic response from teachers and students alike attests to the success of the program.

We ask you to ensure the continued support of USDA as an important resource and clearinghouse component of the program. In order to maintain its level of success and ensure the continuity of the program, we request that:

(1) Agriculture in the Classroom be authorized by Congress in the same form and structure as it has operated since its inception.

(2) Agriculture in the Classroom be funded at sufficient levels to maintain its high program standards, and commensurate with its high level of success within our schools.

I thank the committee for the opportunity to speak about this important educational program.

STATEMENT OF SHELBY L. PRICE, SUPERINTENDENT, JACKSON EDUCATION SERVICE DISTRICT

I appreciate the invitation by Chairman Combest to address the subcommittee this morning. My name is Shelby Price and I am superintendent of Jackson Education Service District in Medford, Oregon. My resume, which includes a description of our regional education service district, is attached to the written document.

AGRICULTURE LITERACY

We are convinced that a need exists to expand the knowledge base about Agriculture Literacy. The food and fiber system in the United States of America delivers over $980 billion to this nation's economy. Nearly 20 percent of the American work force is employed by agriculture.

The industry of agriculture is either ignored or is scrutinized by individuals and the media who most often lack understanding of the comprehensive issues surrounding Agribusiness in this society. Resources must be directed to provide an informed, educated and balanced view about agriculture rather than to be defensive about practices under attack. We believe that our education system is the most economical and efficient way to create an improved climate and understanding about agriculture.

Agribusiness has a long history of being superbly instructed by vocational agriculture teachers in high school courses and F.F.A. programs across this nation. The learners, however, are most often agriculture aware people who encompass a very small percentage of the total student population in our nation's schools. We need to expand the understanding and awareness level by utilizing the system, people and programs already in place.

We propose a Food and Fiber Curriculum oriented to sixth or seventh grade students which can easily be infused to the existing subject matter areas of science, mathematics, and social sciences by the regular classroom teachers. Support and professional development activities for teachers will be available from local high school agriculture-science teachers and agriculture trained elementary teachers. This support system will be available, but the extent of utilization is strictly a local district decision.

The intent of this project is to develop and provide curriculum significantly different from the traditional paper based format. We invision a Food and Fiber Curriculum using teacher, parent and student, user-friendly multimedia kits consisting of: Video Programs,Computer Work on the Internet, CD-ROM, Non-perishable Agriculture Products, Simulation Games, Study Guides, Creative Short-term Research Projects.

Topics for inclusion in the Food and Fiber Curriculum will be:

The Origin of Food, The Sources of Fiber, Environmental ServicesAgriculture: Career Opportunities, Economics, Marketing, National & International Trade, Packaging, Processing, Safety and Sanitation, Technology, Transportation

As previously stated, the American economy is heavily dependent on agriculture. Too few people comprehend the impact of this historical industry.

Farming in America is still a family business. As the number of farms decline, so do the number of farmers, however, production per farmer continues to increase.

One American farmer feeds 129 people. Of this number 101 are in this country and 28 over seas. Our best agriculture customers are Japan, Canada, Mexico, Western Europe and Latin America. America produces 16 percent of the world's food on 7 percent of the world's land. When looking at the world, food is most affordable in the United States.

The history of our nation is founded on "what's" good for agriculture, is good for America. The industrial revolution appeared and people flocked to cities for new employment opportunities. Henry Ford developed the assembly line and later the term used in Washington was "what's good for GM, is good for America." We think it's time to renew, "what's good for agriculture, is good for America."

Since one American worker in five earns his/her living by agriculture, this proposed curriculum will engage in career awareness and career development. Students will examine existing careers and explore emerging opportunities such as: farmers and farm managers,researchers, food scientists, commodity brokers,economists nutritionists, teachers, bankers, sales, agriculture researchers, product packaging, marketing-domestic and foreign product transportation.

The Agriculture Literacy Project will also address political problems and issues surrounding agriculture. Educators can provide leadership to promote pro-active positions about the value of and need for, solutions to issues in this nation's most basic and essential industry.

Examples:

Immigrant Labor, a prevalent issue with fruit and vegetable production and meatpacking; Swine Megafarms, effluent discharge into lagoons, thus leaking into fresh water supplies; Federal Inspections-Meat Imports and Exports, Australia exporting kangaroo meat to the U.S.A. under the guise of beef, U.S.A. exporting horse meat as beef, The Endangered Species Actthe ramifications of irrigation in the western StatesAgricultural Grazing on Public Lands, Food Safety, Mad Cow Disease-British Isles and suggested threat in U.S.A., apples and Alar concernsrestaurant sanitation and food preparation (e.coli bacteria) Water and Vegetation Issues,herbicide and pesticide applications

Public schools are responsible for providing a free comprehensive and appropriate educational program for all of the children of all of the people. To accomplish this, classroom teachers need a realistic teacher-friendly curriculum to be available to sixth and/or seventh grade teachers in Portland, Oregon, Dallas, Texas, San Francisco, California and every other community in the Nation.

Agriculture Literacy will not attempt to promote anything other than an understanding of land and water issues, as they relate to our nation's economy and future. Agriculture Literacy will not ask schools to add more teachers, additional classes or purchase more equipment. This instructional strategy will be designed to use technology as the instructional tool to impact students, parents and teachers.

We are willing to work with industrial support from agriculture but we are not willing to promote commodities or to engage in environmental arguments. The goal is to feature agriculture and to use it as a teaching tool for understanding.

Program delivery will be augmented by vocational agriculture teachers serving as members and professional development specialists. Multimedia kits will be designed to engage the teacher and parents, as well as students. Video lessons (closed caption consideration), interactive CD-ROM, and computer instruction will replace printed materials of the past. The host/narrator selected for the multimedia presentations will be someone held in high esteem so as to present a positive image and identification.

Satellite-based Distance Learning and Internet availability with support materials, will impact classrooms and provide ongoing dialog between students, teachers and parents regardless of school district and geographic regions. Electronic field trips broadcast by satellite and/or "Learning Channels" will broaden the impact of the curriculum content areas throughout the Nation.

The Food and Fiber Curriculum will be congruous with State and national science, mathematics, and social science standards. In addition, particular attention will be devoted to State educational improvement agendas as materials are developed, field tested and refined for general use.

The following topics will require multimedia instructional kits for the Food and Fiber Curriculum:

Where Food Comes From
The Foundations of the Industry: Water, Soil, Sunlight
How Agriculture Goods Are Made Consumer Ready
Where Clothing Comes From
How Agriculture Impacts the Labor Force and Economy
Agricultural Products That Are Not Eaten or Worn
Renewable Versus Non-Renewable Resources
American Agriculture's Role in World Trade
The Role of Technology/Education in Production
Employment in the Agriculture Industry

The original participating States will be Oregon and Texas, where existing alliances are strong within the vocational agriculture community. Agri-science teachers from Texas and Oregon have met to plan and discuss the concepts of this project. Their meeting sessions were held in Texas in conjunction with the spring meeting of the leadership of the Agriculture Teachers Association of Texas. Executive director, Guy Finstad, was a participant. Both States have made a commitment of time and money to cover planning, substitute teachers, research activities and travel.

Teachers from the pilot States will commit to develop a system, in partnership with the private curriculum firms, to provide inservice training and project development activities to school districts within their relative states. A goal is to develop a system which will serve as a national guideline. It is our intent to cooperatively develop the first Agriculture Literacy multimedia kit Where Food Comes From and to field test those materials with 300 students in each State. Prior to this, however, we find it necessary to attend to an organizational structure and we propose and recommend the following:

PROJECT BOARD: A six-member group consisting of four vocational agriculture teachers (two from Oregon and two from Texas); an Education Service District superintendent from Oregon, and the executive director of the Agriculture Teachers Association of Texas. Project board members are not eligible for pay from project funds. They are eligible for basic travel expenses for essential meetings of the board.

The project board will select a project director who will coordinate all phases of this three-year project. The project director will be responsible to the project board and will direct all project goals, objectives and operating procedures.

ADVISORY GROUP: The project director will establish a four/five member Advisory Group composed of representatives from Oregon and Texas: two grade-level appropriate teachers, one elementary school administrator, and one curriculum and instructional specialist from higher education. In addition, the Chairman of the House Agriculture Committee may appoint one member.

After the students from Oregon and Texas have concluded their studies of Unit 1 via the integrated curriculum, the advisory group will review all lesson plans, materials, and third-party evaluation data. They will advise the project director about next steps at that point. We expect to enter into a revision cycle of multimedia kit Unit #1 based on the professional recommendations of the advisory group.

As soon as possible thereafter, the revised materials will be field tested with an additional 300 students in each of the two pilot States (Oregon and Texas). At the conclusion of this activity, the advisory board will again review data and make recommendations to the project director and, by mail, to the project board.

If there is agreement that the project has developed quality products and processes, we would proceed with first-time use for 300 students in three other States. At the same time, development would begin on mutlimedia kits

Unit #2The Foundations of the Industry: Water, Soil, Sunlight
Unit #3How Agriculture Goods Are Made Consumer Ready

for field testing in pilot States, to be completed by the conclusion of the project, September 30, 2000.

At project conclusion we anticipate that private curriculum development and marketing firms will be ready to assume the role of distributor. Their product sales should include a clause which ensures a payback to the Federal Government. That figure should represent the total cost of the investment and be returned on a percentage basis over a ten-year period of time.

This proposal to develop Agriculture Literacy and understanding by using our most basic industry as a contemporary teaching tool is not revolutionary or very creative. It is surrounded by simple, common sense.

It does not place new funding requirements on States. It calls for a slight redirection and utilizes existing staff and resources. Vocational agriculture teachers have an outstanding instructional track record. Perhaps this is due, in some degree, to the fact that these educators get to know each student three ways:

in the classroom, through student activities,through involvement with the student's family.

Vocational agriculture teachers will become resources and professional development specialists for the sixth and/or seventh grade teachers in their respective school districts.

This technology based curriculum will not be forced on any district or teacher. It will be a quality, up to date, useful tool, teachers will want to use.

The use of technology based curriculum, to impact students, parents and teachers, follows the educational direction of the Federal Government, States and most local school districts. Education has or is acquiring equipment and access to the wealth of information which is readily available via satellite, CD-ROM, video programs and the Internet. Let's use it creatively.

STATEMENT OF DR. BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Thank you Mr. Chairman. I am Dr. Bob Robinson, Administrator of the Cooperative State Research, Education, and Extension Service (CSREES) at the United States Department of Agriculture (USDA). I am pleased to be here today to discuss USDA's education and extension programs.

Mr. Chairman, I mentioned in our June 17 hearing that the administration has four principles around which we are currently developing a legislative proposal for consideration by this Subcommittee at the hearing you have scheduled for July 16.

1. The Department of Agriculture and the Research, Education and Economics (REE) mission area invest in creating and strengthening the research and educational capacity essential to meeting national goals for the food and agricultural system.
2. The programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.
3. The Federal Government has a distinct role to play in partnership with State and local governments and the private sector.
4. Wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as diverse institutions performing research, education and extension.

Mr. Chairman, in my testimony several weeks ago, I focused on the fourth principle—that a wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as diverse institutions performing research, education and extension. At our hearing today on extension and higher education, I would like to focus on the first and second principles.

First, it is the goal of the Department of Agriculture and the Research, Education and Economics agencies to invest in creating and strengthening the research and educational capacity essential to meeting national goals for the food and agricultural system. Second, the programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education. The extension and higher education programs of the USDA are managed within the Cooperative State Research, Education, and Extension Service (CSREES).

CSREES Higher Education Programs

Mr. Chairman, American agriculture is being challenged as never before to develop and use new technologies, to expand industrial uses of agricultural materials, and to operate in a way that is both internationally competitive and environmentally sensitive. At the same time, the quality of life in the United States is being challenged by threats to health, economic well-being, and family stability. Our success in maintaining world leadership in agriculture and in providing our population with the best possible quality of life depends on a critical mass of highly-trained and creative scientists and professionals dedicated to solving current and future problems. USDA's higher education programs are an investment in maintaining world leadership and are designed to strengthen higher education in the food and agricultural sciences. While the States are primarily responsible for educating our young people, USDA works in close cooperation with the higher education system to identify critical emerging issues, to establish national priorities, and to promote public and private partnership ventures for promoting excellence in education. Similarly, our USDA programs are designed to act as a catalyst for State and local initiatives to better educate young people in the food and agricultural sciences.

In 1977, Congress recognized the significance of educating scientists and other leaders for the future and authorized higher education programs at USDA for the first time in Section 1417 of the National Agricultural Research, Extension, Teaching, and Planning Act of 1977 (NARETPA). The NARETPA designates USDA as the lead Federal agency for higher education in the food and agricultural sciences. Section 1417 enables CSREES to offer a broad portfolio of primarily competitive programs to strengthen higher education.

Mr. Chairman, 20 years ago when this authority was created, America's agricultural colleges and universities faced declining enrollments, employed a maturing faculty with a shortage of new professors coming up the ranks, and had adopted an out-dated curricula that neglected newer fields like agribusiness and biotechnology. In 1977, the student population in agricultural colleges lacked diversity although women were starting to enroll in greater numbers, and the agricultural disciplines were failing to attract their proportionate share of the most talented students because financial incentives were not available as they were in other fields.

Because of the outstanding flexibility and breadth provided by Section 1417 of NARETPA to focus programs and policies on changing priorities, we have been able to address all of these problems and substantially solve some of them. We still have a shortage of students at the Ph.D. level in agricultural fields, but we no longer face shortages of undergraduates, and our undergraduates have a very successful placement rate. We now have strong programs in agribusiness, food sciences, and environmental sciences, and we are effectively training the next generation of faculty. Where we still face challenges is in gaining greater diversity in higher education in the food and agricultural sciences.

USDA's higher education programs include five competitive and two formula grants programs, as well as other important initiatives. They are:

The National Needs Graduate Fellowships Program, begun in 1985, which is targeted specifically to recruit and train predoctoral students in areas where shortages in expertise have been identified. The program is part of a national investment strategy to attract diverse and talented U.S. students to pursue advanced degrees in the food and agricultural sciences. The six targeted national needs areas are: animal biotechnology, plant biotechnology, human nutrition and food sciences, agribusiness marketing or management, water science, and engineering (food, forest, biological, and agricultural).

The Higher Education Challenge Grants Program, begun in 1990, is designed to promote excellence in education by encouraging improvements in curricula; promoting faculty development; expanding student experiential learning opportunities; using new technologies for enhanced instruction delivery systems; providing up-to-date equipment; and strengthening student recruitment and retention.

The 1890 Institution Capacity Building Grants Program, begun in 1990, strives to achieve three major goals: to strengthen linkages among the historically black 1890 institutions and with other colleges and universities, the USDA, and private industry; to advance cultural diversity of the food and agricultural scientific and professional work force by attracting and educating more minority students; and to enhance the quality of teaching and research programs at the 1890's and Tuskegee University.

The Multicultural Scholars Program, begun in 1994, is designed to attract and educate more undergraduate students from traditionally under-represented groups for careers as agriscience and agribusiness professionals by providing scholarships.

The Endowment Fund and the Education Equity Grants Program for 1994 Land-Grant Institutions, (1994 Act) were authorized in 1994 and funding began in 1996. The Endowment Fund currently has a total of $9.2 million. Each year, the interest earned from the principal is distributed by a formula to the 29 Tribal and other colleges defined in the 1994 Act. The Education Equity Grants strengthen instructional programs in food, agriculture, and related areas by improving curricula, student recruitment and retention, faculty preparation, instruction delivery systems, and equipment and instrumentation for teaching.

The Hispanic-Serving Institutions Education Grants Program, begun in 1997, was authorized by Congress in Section 815 of the FAIR Act. It is intended to promote and strengthen the ability of Hispanic-Serving Institutions (HSIs) to attract outstanding students and produce graduates capable of enhancing the Nation's food and agricultural scientific and professional work force.

CSREES' higher education unit also sponsors a national initiative, which is the online database of the Food and Agricultural Education Information System

(FAEIS). FAEIS tracks a broad range of statistics on student enrollment, graduates, faculty, placement of graduates, and employment opportunities. FAEIS will be a significant contributor of data important to accountability of USDA's Higher Education Programs in the context of the new Research, Education, and Economics Information System (REEIS) mandated by Congress in Section 804 of the Federal Agricultural Improvement Act of 1996 (FAIR Act.) The REEIS system is being designed to enable the Secretary of Agriculture to measure the impact and effectiveness of research, extension, and education programs according to priorities, goals, and mandates established by law, such as the Government Performance and Results Act.

CSREES; Higher Education Programs office just recently started administering the USDA Ag in the Classroom program. The mission of Ag in the Classroom is to help students in grades K–12 become agriculturally literate. The objective of this program is to encourage educators to teach more about our food and fiber system and the critical role of agriculture in our economy and society. This new linkage between our Higher Education Programs and Ag in the Classroom will enhance opportunities for partnership ventures to promote excellence in education.

Youth Programs within Extension. Mr. Chairman, one of CSREES most widely-recognized and respected programs is a significant youth development program, 4–H. More than 5.4 million youth are participating in 4–H programs annually, with a focus on natural and biological sciences literacy, nutrition and health, civic education, youth involvement, community service, workforce preparedness, economics, and entrepreneurial education. We are working with our partners to increase opportunities for high school youth to participate in voluntary leadership roles with younger youth.

Other youth development programs address the risks presented to our Nation's children at an increasingly younger age: crime, drugs, and sexual activity. Since 1991, the Children, Youth and Families At Risk (CYFAR) initiative has worked with communities identified by participating States to focus on school-age child care, science and technology literacy, family resiliency, decisions for health, and collaboration—encouraging interested people and groups at all levels to work together to solve problems. The money provided by the CYFAR program has enabled communities to use many different strategies to support those at risk. Recently, CSREES entered into an interagency agreement with the Department of Army to address the needs of children living in Army installations around the world.

CSREES Extension Programs

In 1994, as part of the reorganization of USDA, Congress merged the former Extension Service and the former Cooperative State Research Service into one agency, the Cooperative State Research, Education, and Extension Service (CSREES). The mission of CSREES is to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and extension programs in food, agricultural, and related sciences in partnership with both the public and private sectors.

The partnership includes the Cooperative Extension Services (CES) and 103 Land Grant institutions. This partnership links the education and research resources of the U.S. Department of Agriculture and the land-grant universities with 3,150 county and administrative units throughout the country. CSREES is a Federal partner in a partnership that also includes the 59 State and Territorial Agricultural Experiment Stations; the 17 1890 land-grant institutions, including Tuskegee University; the 63 Forestry Schools; the 27 Colleges of Veterinary Medicine; 42 Schools of Home Economics; and the 29 Native American Institutions which now have land-grant status. In addition to the land-grant partners, CSREES has partners in virtually all segments of the agricultural community, including private and public colleges and universities; Federal laboratories; private industry; State, county, and local governments and entities; and individuals.

In creating CSREES, Congress intended that CSREES create stronger linkages between research and education. Examples of integrated research and extension programs are water quality, sustainable agriculture, integrated pest management (IPM), and pesticide impact assessment. Achieving our Federal goals requires cooperation with the university system and other partners. In the integrated pest management program, for example, IPM research and education conducted at Texas A&M has saved the economy $1.5 billion per year and reduced the use of pesticides and insecticides by 17.3 million pounds. Adoption of IPM practices in cotton production has cut in half annual insecticide applications in Missouri. Using fewer insecticides, Tennessee cotton growers boosted net profits by an average $19.72 an acre. IPM techniques developed at Louisiana State University allowed cotton growers to cut insecticide applications by 25 percent for a savings of $32 million.

The President's Food Safety Initiative, which is part of the administration's FY98 Budget Request, includes a total of $9.1 million for USDA with $4.0 million in

CSREES research and extension. This is our most recent example of an effort to integrate research and extension objectives. Consumers demand and should be assured a safe food supply. Both research and extension have the potential to help reduce or eliminate food-borne risks by: developing methods to minimize risks in animal and plant production practices; identifying and promoting appropriate pre- and post-harvest practices; testing and introducing new methods at meat and poultry plants to reduce the incidence of pathogens under the Hazard Analysis and Critical Control Point (HACCP) system; by developing and promoting safe transportation and distribution practices; and, by conducting research on consumer behaviors and what will effectively encourage consumers to adopt safe food handling practices.

Food safety research is funded under our National Research Initiative and is also a CES National Initiative. In managing these programs, we strive to link the multidisciplinary research from diverse sectors to solve complex food safety issues to provide the basis for new training programs, which should reduce the incidence of foodborne disease.

The Midwest Water Quality Initiative (also called the Management System Evaluation Area (MSEA) project) is supported by the research and extension water quality programs of CSREES as well as other Federal agencies. The initiative has contributed to many improvements in water quality in major agricultural production areas with producers involved with scientists and extension personnel in designing and field testing alternative farming systems. In Iowa, for example, producers have developed greater understanding of practices to improve efficient nitrogen use; to reduce surface runoff (which in turn reduces the transfer of fertilizer into the water table); to better use buffer and filter strips to improve surface water quality runoff into streams; and to efficiently manage application of herbicides to reduce their presence in the environment and change the pattern of movement in the landscape.

Extension's Expanded Food and Nutrition Education Program (EFNEP) very effectively teaches nutrition to low-income audiences in all 50 States and territories. Nationwide, evaluations of the program report:

85 percent of program participants said they improved management skills, such as planning meals and comparing prices;

91 percent of participants reported improved nutrition practices such as making healthy food choices and reading nutrition labels; and

66 percent said they improved food safety practices.

The evaluations demonstrate that the EFNEP program is accomplishing its goals that program participants make wiser food choices resulting in more efficient use of household funds and make more nutritious choices resulting in a better balanced diet.

Funding Authorities for Extension Programs

Extension programs are authorized by the Smith-Lever Act of 1914, the National Research, Extension and Teaching Policy Act of 1977, as amended, the Equity in Educational Land-Grant Status Act of 1994, and companion legislation in each State and territory. The Cooperative Extension System (CES) is funded jointly by Federal, State, territory, and local government funds, with the majority (over 70 percent) provided by the two nonFederal partners.

Extension base programs are supported by Smith-Lever 3(b) and 3(c) funds, which are distributed to the States based on a statutorily-defined formula. Base funds represent a significant Federal investment in educational and problem-solving capacity of Land-Grant Institutions. Programs funded through base funds comprise the core mission of the CES. They are dynamic, results-oriented educational activities that receive significant resources from the national, State, and local levels. Each base program focuses on a single subject-matter but encompasses multiple disciplines. The current base programs are:

Agriculture, Natural Resources and Environmental Management, Nutrition, Diet and Health, Community Resources and Economic Development, 4–H and Youth Development, Family Development and Resource Management, Leadership and Volunteer Development

The national initiatives of the CES are funded both from base programs Smith-Lever 3(b) and 3(c) funds and Smith-Lever 3(d) funds and receive a special emphasis for a limited period of time. As issues develop that warrant national attention, USDA and CES jointly select initiatives relevant to the extension mission. The current national initiatives are: Children, Youth and Families at Risk, Managing Change in Agriculture, Food Safety and Quality, Communities in Economic Transition, Water Quality, Sustainable Agriculture, Decisions for Health

Extension as an Agent of Change. Mr. Chairman, the value-added of the Cooperative Extension System is its ability to design, develop, and deliver educational programs that meet the unique needs of local people as they adjust to change. In every

State, the number and type of educational programs are determined largely by land grant university extension faculty working with stakeholders to solve their problems and take advantage of opportunities associated with scientific and technical advances and major changes in the agricultural sector. Extension's ability to leverage change for the benefit of producers and consumers depends on active partnerships and input from stakeholders. We accomplish these goals through strategic planning and development of research and education programs in cooperation with our partners.

For agriculture to remain a vital part of the Nation's global economy, 21st century producers must have access to the most current technology, skills and knowledge. In the context of the most recent change for American producers—the Federal Agricultural Improvement and Reform Act of 1996 (1996 Farm Bill)—we are focusing on improving agricultural productivity, creating new products, protecting animal and plant health. Extension is developing programs to implement the Managing Change in Agriculture initiative in order to:

help farmers better understand and manage risk; encourage diverse crops and diverse approaches to farming; find ways of working land that sustain agriculture and rural communities; help farmers select and manage information effectively; discover and explore potential new markets; and give farmers the tools—new products, new practices, new methods of business organization—to compete successfully in the global marketplace.

To maintain and improve agricultural competitiveness, these programs are designed to help agricultural producers develop and implement business procedures to take advantage of new marketing opportunities and manage increased risks inherent in their changing environment, such as changes in government commodity price support, disaster assistance and crop insurance programs. These programs also recognize the interdependence of all players in a product pipeline—from providers of animal genetics to sellers of consumer-ready beef, pork, poultry and dairy products.

A critical function—and continuing challenge—of the CES is efficient technology transfer. The research and technology base of the Land Grant universities provides the foundation for Extension programs, and that base enables CES to effectively respond to site-specific needs of stakeholders and communities. One of the strengths of CES—its flexibility—has allowed extension to respond to changing needs and demographics, advancing technologies, and changing environments. As a result, CES has increasingly operated as an information broker to disseminate research results to those who need the information to solve practical problems. CES is actively exploring new developments in information technology, such as use of the Internet, to more efficiently disseminate research results to the broadest possible audience.

CES also responds to the challenges faced by States in rural and urban communities, such as the recent changes in welfare legislation and the feeding programs. Just last April, CSREES, the Land Grant Universities, and other Federal agencies jointly sponsored a workship to assist in mobilizing the resources of State universities and Land Grant colleges to successfully implement welfare reform legislation and provide people with the skills needed to move from welfare to work and self-sufficiency. The workshop resulted in a plan for coordinated national research and extension outreach education, which would: (1) monitor State and local responses to Federal legislation, focusing on gains and losses resulting from Federal program decentralization and policy deregulation; (2) measure the social and economic implications of welfare reform on children, youths, families, and communities; and (3) enhance the well-being of children, youths, families, and communities. Our programs focus on promoting human health and nutrition, strengthening children, youth, and families, and revitalizing rural American communities.

Other Innovative Partnerships. CSREES also is working to leverage existing Federal programs at USDA and other Federal agencies to provide more and better services for our customers. For example:

(1) We are working with Natural Resources Conservation Service, the Agricultural Research Service, and EPA and the private sector to design and conduct a series of workshops in the Fall of 1997 to explore opportunities to strengthen linkages between agricultural productivity and natural resource conservation. We hope to act as a catalyst to spur development of new, broader coalitions which can work together to achieve a competitive and environmentally sustainable agriculture and forestry production system.

(2) CSREES and the National Institute on Standards and Technology (NIST) are developing pilot projects linking CES with university partners to provide technical assistance to rural manufacturers in support of rural development objectives; evaluating organizational approaches to better facilitate university, CES, and manufacturing center collaboration; and exploring development of a memorandum of under-

standing between NIST and USDA to promote closer cooperation among agencies involved in rural economic development.

(3) CSREES has under development an interagency agreement with the Departments of Housing and Urban Development (HUD), Health and Human Services (HHS), and Education to cooperate to provide economic opportunities and supportive services to public housing and other residents in communities impacted by welfare reform. HUD and HHS each are making $2.5 million available in grant funds to support competitive grant programs—the Community Partnership for Resident Uplift and Economic Development —which will help support economic development, job creation, employment readiness activities and coordinated social services. Through this partnership, State and local Extension Services will provide youth and family extension education in the participating sites.

Mr. Chairman, I want to thank you for holding this important hearing. I plan to present a comprehensive overview of the administration's position on reauthorization of the research, education, and extension title at the hearing next week. I would be happy to answer any questions about our programs.

TESTIMONY OF DR. A. CHARLES CRABB, DIRECTOR, SOUTH CENTRAL REGION, UNIVERSITY OF CALIFORNIA, DIVISION OF AGRICULTURE AND NATURAL RESOURCES

Good morning, Mr. Chairman and distinguished members of the Committee. Thank you for the invitation to appear before you today to speak about the important work of Cooperative Extension. I am Dr. Charles Crabb, Director of the University of California's Agriculture and Natural Resources Programs in the South Central Region of the State. This region includes the counties of Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, San Benito, Santa Cruz, Stanislaus, Tulare, and Tuolumne. These include six of the ten leading agricultural counties in the United States. I am here today on behalf of the University of California and its Division of Agriculture and Natural Resources. The Division spans the entire State with three colleges of agricultural sciences, a school of veterinary medicine, ten research and extension centers, more than 50 county based Cooperative Extension offices, and a natural reserve system with over 30 sites.

My testimony today will focus on a few examples of the many partnerships between University of California Cooperative Extension and the private sector. These are critical for sustaining California's broad based and dynamic agriculture economy which generates $22 billion in annual revenue and accounts for nearly one of every 10 jobs in the State. Since this subcommittee is in the midst of mapping out the future of Federal support of Cooperative Extension through the reauthorization of Title VIII of the Farm Act, I will also summarize for you the Division's recently released strategic plan, a framework for making critical decisions on managing our budgets, time, and organizational structure with limited resources.

First of all, however, I would like to draw attention to the rich land-grant tradition of the University of California's Cooperative Extension. Since enactment of the Smith-Lever Act of 1914, University of California Cooperative Extension has been engaged in taking the University to the people of California. The early role of the advisor in the University of California Cooperative Extension program involved solving local farm problems through localized applied research and regular demonstrations at farm centers, which were often local school houses, and required traveling long distances down dusty roads for personal visits with farmers and rural communities.

The roots of some of the States most notable commodities such as citrus, nuts, grapes, and vegetables took firm hold during the second decade of this century when University of California Cooperative Extension advisors brought the latest discoveries in pruning techniques, pest management, irrigation and soil management to the rural majority of California's population. The 20th century represents an era of booming growth for California agriculture, and the University of California Cooperative Extension program has been there throughout, helping to set record levels of production in good seasons and stave off disaster during droughts, floods, and insect infestations—and we have had our share of all three.

From the beginning, however, the Cooperative Extension program in California has been about more than just farm production. Early farm advisors were active in campaigns for better roads and rural electrification, established lunch programs in rural schools, helped people improve food handling and safety, gave people a better understanding of nutrition, and set up portable fire fighting units for the public to use to battle range fires during the dry summer months. Those first farm advisors also began youth agricultural clubs as an after school activity, a forerunner of the 4-H clubs that we have now.

Today, with a total budget of approximately $64 million (61 percent State, 19 percent Federal, and 20 percent local government and private), UC Cooperative Extension operates in an environment vastly different from that of the pioneering farm advisors of 1914 who worked in a State of 2.4 million people with 110,000 farms.

Agriculture is still the State's leading economic generator, with farm gate production totaling about $22 billion. However, less than 2 percent of Californians are directly involved in farming today. In fact, more than 90 percent of the States 32 million residents reside in urban areas.

But while times have changed, the expectations of the Cooperative Extension program remain the same-ensuring safe and efficient food production, preserving the natural environment and resources, and contributing to strong homes, families and youth. Each of the residents in the State of California benefits each day both directly and indirectly from the impacts of the University of California Cooperative Extension programs, be it through abundant and safer food supplies, reduced food costs (freeing people to spend money in other segments of the economy), better water quality, increased water quantities, improved air quality or better natural resources management practices. The goals of improving the quality of life for people both on and off the farm in a time of limited resources and growing demand (California's population is projected to double to 63 million by 2040) present challenges that are met in part through expanding partnerships with the private sector.

Examples of Partnerships. The first illustration of an effective partnership with the private sector is the combined effort of the University of California School of Veterinary Medicine, California Milk Advisory Board, Pharmacia-Upjohn, and US Department of Agriculture in the development of a vaccine against the deadly E. coli mastitis. The vaccine was developed, field tested, and made available through commercial channels. The close link between research and extension accelerated the adoption of the new vaccine within the dairy industry. It is estimated that the use of the vaccine saves the California dairy industry as much as $11 million annually, the United States dairy industry over $50 million annually and helps to ensure a constant supply of low cost and safe milk to consumers. It is clear that the partnership with other agencies and the private sector provide significant benefits to the taxpayer.

The value of public/private partnerships is also illustrated by the research and extension advancements made possible by the development of a state-of-the-art post harvest fruit handling facility at the UC Lindcove Research and Extension Center in Tulare County. Lindcove is the premiere citrus research facility in the San Joaquin Valley. A modern fruit handling facility was developed with funding from the California citrus industry. Identification of critical issues by county based Cooperative Extension advisors helps to drive applied research at the facility. Research by both campus-based faculty and county-based advisors contributes to the success of the partnership. Early benefits from this partnership include new fruit handling processes that can be used to allow growers to reduce dependence on field applied insecticides. Consumers benefit from the increased supply of high quality fruit and lower levels of pesticide use.

The third example involves another field research facility. A number of years ago the Agricultural Research Service (ARS) of the USDA determined that it was not possible to keep its Shafter Cotton Research Station open. Shortly thereafter, representatives of the cotton industry in the southern San Joaquin Valley approached the University of California's Division of Agriculture and Natural Resources with a plan to re-open the station. Today, the Shafter Research and Extension Center is operated by the University of California and funded by the cotton industry. This partnership with the private sector has allowed the University of California to focus on funding the human resources necessary to conduct the applied research at the Center and has fostered restored participation by ARS. Representatives from the cotton industry work closely with the University of California to help ensure the highest priority research is carried out at the Research and Extension Center. The continuum between basic research on campus, applied research at facilities like the Shafter Research and Extension Center and the county based Cooperative Extension programs has been enhanced by the private sector participation in this partnership. This public/private partnership has benefited the public with research results that have reduced industry dependence on pesticides, improved air quality with changes in defoliation practices and increased efficiencies in water used to produce cotton.

The Future: The Challenge of Change. Two months ago, the Division Agriculture and Natural Resources released a strategic plan entitled "The Challenge of Change." I have submitted a copy of this plan for the Committee record. The plan articulates our vision for continued contributions to the State, the Nation and the world, and our expectation of an evolving organization to meet the challenges of the 21st century. It recognizes that resources are scarce, and the achievement of our goals requires us to do more with the limited resources available to us, set priorities, and consult regularly with our stakeholders.

In developing the Strategic Plan, we considered interrelated trends which have profound implications for the Division's scientific and educational expertise. These trends are projected to continue into the next century:

The urbanization of California; Accelerated population growth in the State and the world; Increasing competition for land and other natural resources; Threats to environmental quality and rising public concern about environmental health and food safety; Increasing cultural diversity and the socio-economic stratification of California's population; A global economy, interdependence among agricultural and natural resource systems around the world, and increasing international trade; Continuing advances in information systems and communication technology; Continuing restructuring of local, State, and Federal Government; Changes in governmental regulations and their influence on agricultural production, and on landscape and natural resource management.

The development of a strategic plan to serve as an iterative and on-going guide to respond to these challenges required the input of hundreds of scientists, educators, and stakeholders over a period of two years. The resulting "Challenge of Change" plan includes both program priorities and organizational management strategies and incorporates the following themes:

An inclusive, accountable and visible process for resource allocation; A mission-based reward system; Special awards to recognize programmatic and organizational excellence; Updated communication infrastructure; A broadened funding base, enhancing existing resources and including new funding sources; More effective use of volunteer programs;More effective public relations and external communications with stakeholders and decision makers.

The strategies and themes center around a set of generalized priorities for the mid-term future: agricultural productivity, efficiency and sustainability; pest and disease management; integrity and sustainability of biological systems; watershed management; water allocation and management; human resource development; and community development. Putting the strategies into action will involve a number of mechanisms ranging from immediate implementation by administrators to long-term action through task force guidance.

A decision has been made within the Division of Agriculture and Natural Resources to involve a broad range of stakeholders in the review of our strategic planning efforts. The goal is to ensure our sense of the future is reasonable and that our priorities align well with the needs of those who will feel the impacts of our programs. Since the release of the "Challenge of Change" we have conducted four stakeholder input sessions in different regions of the State. This involvement of stakeholders in our planning represents a continuing process to insure input into our plans and priorities.

CONCLUSION. The reauthorization of Title VIII of the Farm Act presents those of us involved in agricultural education, research, and extension an opportunity to improve a system which over the years has proven its ability to adapt and succeed. There will, of course, be debates over whether the original land-grant agricultural mission goals have been achieved. After all, production of agriculture crops has evolved to be extremely efficient; most Americans eat well, and our food supply is safer than it has ever been.

On the other hand, new problems continue to emerge, such as the emergence of new plant pests. Protection of soil, water, air and other natural resources will become more challenging as a growing population pushes the urban and suburban boundaries on to farm land. With a move away from Federal crop support programs, economic risks associated with agriculture production will increase.

Increased knowledge is one way of mitigating those economic risks and helping to ensure a reasonably constant and low cost supply of domestically produced food. Continued public support of agriculture education, research and extension programs will be critical in providing the increased research based knowledge necessary to sustain the substantial economic contribution agriculture makes to California and other States. To remain competitive in this modern and complex time, agriculture will need to rely as much on knowledge about social, economic, and political issues as they do on breakthroughs in agricultural science. The University of California Cooperative Extension program is choosing to be there in the future to serve the State's needs on production-related matters, and at the same time maintain an emphasis on human health, food distribution, food safety, natural resource conservation, and helping to generate the research based information to assist in solving societal problems in rural communities and inner cities.

Mr. Chairman, members of the committee, thank you again for the opportunity to appear before you today to talk about the importance of Cooperative Extension. I would be happy to answer any questions you may have at this time.

EASTER SEAL RECOMMENDATIONS FOR ASSISTING PEOPLE WITH DISABILITIES EMPLOYED IN AGRICULTURE THROUGH THE USDA AGRABILITY PROGRAM

Good Morning. My name is Jon Stauffer. I own a farm near Milford, Nebraska, and have been farming for twenty-nine years. I run a farrow-to-finish hog operation, raising 1700 market hogs per year, and grow 800 acres of corn and soybeans. I also have a disability and have received services from the Nebraska AgrAbility Project. I now serve on the Project's Peer Advisory Network. In my experience, represents a wise investment of Federal seed funds in a public-private partnership that mobilizes and maximizes State and local resources to help disabled farmers to help themselves. It directly benefits farmers with disabilities, their families, and their communities.

I sincerely appreciate the opportunity to be here today to talk to the Subcommittee about the AgrAbility Program. I am accompanied by Randall Rutta, Vice President for Government Relations for the National Easter Seal Society, and am pleased to share Easter Seals' views with the Subcommittee.

I was born with a rare bone growth disease that caused my bones to grow too quickly. From childhood to adulthood, I had more than twenty surgeries. Due to this disease, I have lost two fingers on my right hand, have had several bones fused in my neck, and have some ongoing problems with my hips.

Nine years ago, at the age of 40, I experienced a stroke, which paralyzed my left side. At first, I could not walk and had to use a wheelchair. But, with therapy, I have regained my ability to walk and to slowly use stairs. I cannot run or climb a ladder. Unfortunately, I did not recover the use of my left arm and hand, which before the stroke, were dominant. I had to learn to use my right hand for everything, even with the missing two fingers.

When I was released from the rehabilitation hospital following my stroke, I had to think about how my life might change. That first spring, neighbors helped plant my crops, and a hired man and friends kept them irrigated. I asked my sons to assume many duties on the farm; duties that I ordinarily would have performed myself. Throughout the summer, I feared that this would be the last time that I would watch corn grow in my fields or bring in the harvest in the fall. My farm has been in the family for 100 years. I saw myself as a farmer, and wanted to preserve the farm for my sons. But mostly, for me, farming is a way of life, not just a way of making a living. And that's what I feared the most, that my problem was taking away my whole way of life, not just my livelihood.

At that time, there was no AgrAbility Project in Nebraska. I contacted the Nebraska Vocational Rehabilitation Agency for assistance. Vocational Rehabilitation is a Federal-State program that helps people with disabilities to become and stay employed. A rehabilitation counselor came to my farm to look at ways to help me accommodate my disabilities. Power steering was installed on my tractor and a blacksmith devised a handle for a hydraulic hook-up that I could connect by using my knee and right hand. The counselor also suggested a speaker phone to enable me to write notes while using the telephone and other household items that made life easier. Although the vocational rehabilitation program helped me, it was immediately apparent that program staff had no knowledge about farming or making disability-related modifications to support farm work.

In fact, I have come to understand that it was this information gap in the service delivery system for people with disabilities that triggered the creation of AgrAbility in the first place. Prior to 1991, people with disabilities employed in agriculture frequently confronted disability agencies with little or no expertise in agricultural production. Not surprisingly, such agencies offered little practical help for staying in farming, but instead often recommended moving off the farm to pursue alternative careers. For most farmers and ranchers, such advice is unwanted and unnecessary.

Nationally, an estimated 500,000 farmers and ranchers have physical disabilities that limit their ability to perform one or more essential farm tasks. Each year, 200,000 people working in agriculture experience job-related injuries, with a significant percentage (3–5 percent) incurring permanent disabilities that affect their ability to work. Tens of thousands more across the country become disabled as a result of non-farm accidents, illnesses, other health conditions, and the aging process.

For myself, and many others like me, the presence of a disability jeopardizes one's agricultural livelihood and lifestyle. Rural isolation, a tradition of self-reliance, and gaps in rural service delivery systems frequently prevent agricultural workers with disabilities from taking advantage of growing expertise in modifying farm operations, adapting equipment, promoting farmstead accessibility, and using assistive technologies to safely accommodate disability in agricultural and rural settings. Yet, with some assistance, the majority of disabled agricultural workers can continue to earn their livelihoods in agriculture and participate fully in rural community life.

The AgrAbility Program was established under the 1990 farm bill. The farm bill authorized the Secretary of Agriculture to make grants to Extension Services for conducting collaborative education and assistance programs for farmers with disabilities through State demonstration projects and related national training, technical assistance, and information dissemination. The program combines agricultural know-how with disability expertise to provide people with disabilities working in agriculture with the specialized services that they need to safely accommodate their disabilities in everyday farm operations. AgrAbility received strong bipartisan support during the 1996 farm bill reauthorization, and was extended through fiscal year 1997.

Under the statute, State and multi-State AgrAbility projects engage Extension Service agents, disability experts, rural professionals, and volunteers in offering an array of services, including: identifying and referring farmers with disabilities; providing on-the-farm technical assistance for agricultural workers on adapting and using farm equipment, buildings, and tools; restructuring farm operations; linking disabled farmers to provide peer support; providing agriculture-based education to prevent further injury and disability; and, upgrading the skills of Extension Service agents and other rural professionals to better promote success in agricultural production for people disabilities.

The USDA administers AgrAbility on a fair and competitive basis. Applications for State-level project funding are submitted annually to USDA for peer review and, if successful, qualify applicants for up to four years of support. At the end of a funding cycle, previously-funded projects compete on a level playing field with new applicants. Applications must demonstrate collaboration between a State extension service and one or more nonprofit disability organizations, and must propose a workplan that reflects priorities established by the farm bill. Every year, a dozen or more unserved states seek AgrAbility funding from USDA to initiate project services.

AgrAbility provides customized assistance to farmers, ranchers, and farmworkers with disabilities and their families. The nature and degree of assistance depends on the individual's disability needs and agricultural operation.

I became aware of AgrAbility in 1996, when I heard about a program that was seeking ideas to help farmers with disabilities. I called and was connected with the Nebraska AgrAbility Project. My first impression was that AgrAbility staff really understood farming and disability. AgrAbility staff came out to my farm to assess my hog and grain operation, and my need for additional modifications. They recommended changing my pneumatic feeding system so it would no longer be necessary for me to climb a ladder to send feed to a different bulk bin. A switch that was 10 feet high before was relocated to ground level, enabling me to move the feed myself rather that having to seek help.

Project staff also examined the amount of walking that I was doing in the irrigated fields, which , because they are muddy and uneven, is difficult for me. They recommended a four-wheel drive all-terrain vehicle, called a mule, which enables me to get into the fields and around the farm safely and efficiently. Project staff coordinated the purchase of the feeding system modifications and vehicle with the Nebraska Vocational Rehabilitation Agency, which paid for part of their costs in order to keep me working. My income was taken into account and I shared in the cost of these items.

What is most important to me about AgrAbility is that the staff understand what's involved with farming. They envision solutions to problems caused by disability that make sense to people working in agriculture. Most often, their suggestions involve changes that cost less than $100. For example, for a farmer who has experienced a stroke, getting on and off a tractor can be difficult. AgrAbility often recommends that a couple of steps and grab bars be welded to the tractor to help the farmer get on and off more securely. These items can usually be fabricated with materials on hand and welded on to the tractor either on site or at a neighboring farmer's workshop. In another instance, 4-H members crafted a dozen wind chimes from different materials to hang on buildings and poles to enable a blind farmer to orient himself on his farm as he worked.

AgrAbility is effective because it is a partnership between the Extension Service and one or more nonprofit disability organizations. This partnership engages the agricultural know-how of the Nation's cooperative extension service system and the disability expertise of Easter Seals, Goodwill Industries, independent living centers, and others to jointly solve disability-related challenges and explore alternatives with the common goal of helping a farm or ranch family continue in agricultural production.

The Nebraska AgrAbility Project is one of nineteen projects currently funded by the USDA Cooperative Research, education, and Extension Service. The fiscal year 1997 appropriation of $1.91 million enables USDA to support AgrAbility projects in Idaho, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Dakota, Tennessee, and Wisconsin. The average grant award per State is $85,000, which generally supports one-to-two persons (often part-time), at each partnering agency.

More than a dozen States have sought AgrAbility funding without success, including Arkansas, California, Georgia, and Washington. Other States, including Louisiana, Michigan, New Hampshire, South Carolina, and Vermont, had USDA-funded AgrAbility projects in the past and seek to re-establish their programs. Each of these States can demonstrate significant unmet needs among farm and ranch families affected by disability that AgrAbility could potentially address.

Demand for AgrAbility assistance has skyrocketed since 1991. AgrAbility projects report waiting lists of farm families seeking assistance, and ever-greater numbers of requests for first-time and ongoing help from farmers, farm family members, agribusinesses, rural professionals, and the media. Many projects have had to cut back on educational and outreach activities due to lack of resources. In States not served by AgrAbility, people with disabilities who work in agriculture receive information and advice via the mail and telephone. Because AgrAbility is a one-of-a-kind program, individuals interested in farming and disability have no alternative but to wait for assistance from AgrAbility staff. But waiting in a business dictated by seasons, such as spring planting or fall harvest, is unrealistic. Lacking assistance, many disabled farmers employ unsafe or inefficient methods of accommodating their impairments, often leading to new or more serious disability. Mounting demand for assistance puts undue pressure on AgrAbility staff, who are already struggling to carry-out statewide program activities and attract new sources of funding to the program.

The AgrAbility Program is an essential, unduplicated, hands-on resource for farmers, ranchers, and farmworkers with disabilities. It is the only USDA program dedicated exclusively to helping disabled agricultural producers. It demonstrates the value of public-private partnership by securing donations of funds, talent, and materials to magnify the impact of a modest Federal investment.

AgrAbility projects regularly seek private sector resources to augment Federal funds and thereby enhance the impact of the program. For example, the Kraft Dairy Foundation has contributed $82,000 over five years to help disabled dairy farmers served by the Wisconsin AgrAbility Project. John Deere, Land O' Lakes, Country Companies Farmers Union, Kellogg Foundation, and Reynolds Foundation have invested thousands of dollars in equipment and staff to help AgrAbility clients. In Ohio, Sears and HQ Home Improvement donate materials for building ramps, and SYSCO corporation-manufacturer of Grasshopper Lawnmower-is donating a 28-foot trailer to that state's AgrAbility Project to use as a training center and exhibit.

Locally, individuals and businesses regularly donate money, materials, equipment, and expertise to help disabled farmers. In Michigan, Farm Bureau employees contribute funds to help pay for adaptive equipment that AgrAbility staff recommend. Illinois Rotarians and Elks, and Wisconsin Cheesemen raise funds to meet the needs of farmers that cannot be addressed with Federal seed monies. Last fall, the American Corn Growers Association sponsored the participation of four disabled farmers in the AgrAbility National Training Workshop.

Volunteers are an integral part of AgrAbility. Each project coordinates a peer advisory group that brings together experienced farmers with disabilities with those that are newly injured or have unmet needs and questions. As a volunteer member of the Nebraska Project's Peer Advisory Network, I travel across the State to meet with farmers to discuss their disabilities, share ideas for ways that they might modify their operations, and generally offer advice and support to them and their families. Expenses that I incur as a result of these activities I pay out of my own pocket.

In Nebraska and across the country, AgrAbility provides the strategic insights that promote self-help, peer support, and community responses to disability related challenges. AgrAbility assistance helps prevent farmers from being forced out of farming and, in so doing, prevents the disruption to families and economic damage to rural communities that results. It is estimated that one rural business closes when ten farmers leave farming.

Since 1991, AgrAbility projects have collectively:

Provided direct on-farm assistance to 5,000 farmers, ranchers, and farmworkers with disabilities and their families.

Provided information and advice to 10,000 persons with disabilities employed in agriculture and related occupations.

Educated over 100,000 agricultural, rehabilitation, and rural health professionals on safely accommodating disability in agriculture.

Recruited and trained more than 1,000 volunteers to assist agricultural producers with disabilities and their families.

Reached approximately 6.1 million people through 3,200 exhibits, displays, and demonstrations to increase awareness of the challenges affecting and resources available to people with disabilities who work in agriculture.

The AgrAbility Program is an excellent example of how a relatively modest investment of public resources can boost rural productivity and substantially improve the quality of life for thousands of rural Americans with disabilities. It strengthens rural America by investing in people who, despite having disabilities, are highly motivated to stay in food and fiber production. With project support, these individuals overcome disability-related barriers, work hard, and contribute much to the rural economy. Without support, such individuals might be forced out of farming into nonrural employment, underemployment, or joblessness.

The National Easter Seal Society is proud to contribute to the ongoing success of the USDA AgrAbility Program. In addition to the fourteen Easter Seal societies that partner with Extension Services at the State level, the national society collaborates with Purdue University's Breaking New Ground Resource Center to provide training, technical assistance, and information dissemination services to State-level projects, and provides information on farming and disability to individuals and groups nationwide.

Easter Seals believes that the original 1990 farm bill provision establishing the program in 1990 and restated in 1996, still accurately defines its purpose, scope of activity, and funding authority. Easter Seals is recommending very minor modification of this original statutory language and report language, and has submitted draft language to the Subcommittee for its consideration and use.

Please ensure that the USDA AgrAbility Program is continued in the reauthorization of Federal agricultural research and education programs. Disability is and will probably always be a major presence in American agriculture. Please provide for AgrAbility's ongoing effective and important work. Thank you for your interest and consideration of this statement.

WILLIAM CHARLES JONES, NATIONAL FFA VICE-PRESIDENT, SOUTHERN REGION

Thank you Chairman Combest and Distinguished Subcommittee members for allowing me the opportunity to participate in this hearing. Currently there are over 21 million people involved in the industry of agriculture or 18.5 percent of the labor force. American agriculture is our Nation's largest employer. Over the next 40 years the demand for educated and motivated young people working in the field of agriculture will grow to record numbers. How are we going to meet the expanding employee needs of this growing industry? We will do this through a comprehensive agricultural education delivery system which currently is preparing nearly half-a-million young people in over 7,500 local communities to meet the needs of America's food, fiber and natural resource systems. Your continued support and guidance of agricultural education and FFA will ensure that the talented young people interested in agriculture have access to the training necessary to carry the industry into the next century. My purpose today is to provide you insights from a student's perspective regarding the value and potential of agricultural education.

I have had the opportunity for the past nine years to be involved with agricultural education and, subsequently, the National FFA Organization. Before enrolling in agricultural education in the seventh grade, I was a shy kid with little direction in my life. Then I began to learn about the numerous opportunities in agriculture. I realized agriculture was more than farming. It is a multi-faceted industry that involves opportunities for career success in science, business and technology. Through my involvement in FFA, I learned the value of leadership and community service. Both agricultural education and FFA have opened the doors for me to continue my personal growth by allowing me the chance to further my education. I am now a Junior at Auburn University studying agriculture economics. Agricultural education courses in high school provided me with career direction while FFA provided leadership development and motivation. Both of them have brought me to you today with a clear career path in mind and the professional and technical skills necessary to succeed.

As one of six National FFA Officers, I have had the opportunity for the past eight months to travel across America and see the difference that agricultural education and FFA makes in the lives of young people. The stories we read in newspapers and see on television paint a dismal picture of a country lacking young leaders and entrepreneurs. I have seen with my own eyes that for every negative report you see about young people, I can show you a thousand positive examples of students engaged in progressive career paths, students organizing and leading community growth, and students maximizing their personal potential. The American spirit is alive and well and it is personified through the individuals involved with agricultural education and FFA.

Today, an important thrust in education involves a strong national initiative called "School-to-Work", a system in which students take what they learn in the classroom and actually apply it to real-life situations. Unpublicized to most, agricultural education has been providing that exact system for the past 70 years. Since 1928, learning in the agricultural education system has been the result of three components, the first being classroom instruction. The classroom provides instruction on the technical facets of the agricultural industry. This learning is complemented by the second component, supervised agricultural experience, or SAE. Each student's SAE program provides them the opportunity to actually take what they have learned in the classroom and apply it in on-the-job situations. Clearly, practical application of classroom instruction in the work environment provides the best learning experience available. The third component, FFA, adds the leadership, personal growth and career success skills to complete the total package. The skills provided through FFA range from teamwork, organizational and leadership skills to competition and community service.

For over 70 years the FFA has provided millions of young people like myself the opportunity to grow and become the agricultural leaders for tomorrow. Agricultural education has been ensuring a bright future for all Americans. How are we going to ensure that the young people of today have that same opportunity? We do that by ensuring that agricultural education is available to develop the potential of the next generation of agricultural leaders.

Again, thank you for this opportunity to speak to you about agricultural education, a system that has played a major role in shaping my life and is continuing to impact the lives of over 452,000 young people daily.

hacu Hispanic Association
of Colleges and Universities

June 25, 1997

The Honorable Robert F. Smith
House Agriculture Committee
United States House of Representatives
1301 LHOB
Washington, DC 20515

Dear Chairman Smith:

I am writing on behalf of the Hispanic Association of Colleges and Universities, which represents Hispanic-Serving Institutions (HSIs), to respectfully request that your subcommittee reauthorize our program on the Farm Bill.

We were very pleased that the subcommittee acknowledged the growing importance of HSIs in preparing our students for professions in agriculture by authorizing a program in the Federal Agriculture Improvement Act of 1996. Under Title VIII-Research, Extension, and Education, a new Subtitle H, Programs for Hispanic-Serving Institutions, was created to make competitive grants available to our colleges and universities. Its purpose is to strengthen HSIs' capacity to offer excellent professional programs of study in agrisciences and agribusiness to serve both the needs of American agriculture and the needs of Hispanics.

As in other professional and technical careers, Hispanics remain severely underrepresented in agriculture. Although the U.S. population is over 12 percent Hispanic, less than two percent of those engaged in agriculture-related careers is Hispanic. The USDA has made a concerted effort to diversify its outreach, and this program has USDA's full support. It helps the institutions which attract the majority of Hispanic college students to offer high-quality, up-to-date preparation for jobs which serve a national purpose. It helps our students achieve economic and professional equity. It also helps Hispanics serve the needs of their own communities.

The program allows colleges and universities to reach out to pre-college students to encourage them to excel in subjects--particularly sciences--which will gain them admission to agricultural studies. It encourages colleges to work in consortia to share expensive resources. It promotes the study of nutritional science and allows for work-study arrangements in communities where students are employed by local businesses to bring their studies into the workplace and their business experiences into their studies. It encourages leveraging of federal funds to match dollars from industry. It allows our colleges and universities to lend academic expertise to meeting local and national agricultural needs.

The authority for the HSI competitive grant program under Title VIII was for only one year. We ask that this program be reauthorized until the year 2002. We understand that Congress did not have enough time in 1996 to give the program the consideration necessary to grant a longer authority. We strongly urge the subcommittee to extend the authority so that the 1997 grant recipients can complete their projects and so that more than the current nine institutions can benefit.

We would be happy to offer a witness for the July hearings on Title VIII, and to furnish you with more information about this program.

Sincerely,

Antonio R. Flores
President

ARF/ib

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AGRICULTURAL RESEARCH, EDUCATION, AND EXTENSION PROGRAMS

TUESDAY, JULY 22, 1997

House of Representatives,
Subcommittee on Forestry, Resource
Conservation, and Research,
Committee on Agriculture,
Washington, DC.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 1300, Longworth House Office Building, Hon. Larry Combest (chairman of the subcommittee) presiding.

Present: Representatives Barrett, Smith, Lucas, LaHood, Pickering, Cooksey, Dooley, Brown, Farr, Stabenow, Peterson, Clayton, Pomeroy, Berry, Goode, and Stenholm [ex officio].

Staff present: John E. Hogan, chief counsel; Russell Laird, John Goldberg, Callista Bisek, Wanda Worsham, clerk; and Anne Simmons.

OPENING STATEMENT OF HON. LARRY A. COMBEST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. Combest. The hearing will come to order.

Good morning, and welcome, everyone, here. I would like to thank all of you for coming and the efforts that you have put into your statements and in your travel here.

Today is the last of our four hearings to review agricultural research, education, and extension programs. We plan to conclude our series of hearings on this important subject by discussing specific proposals for reauthorization legislation.

I have found our previous three hearings to be very informative and interesting, but today is when we expect to get into real heavy lifting.

To reemphasize my previous statements, I believe we have a difficult but very important job ahead of us as we approach this reauthorization effort. Today and in the following few months, the subcommittee will search for improvements that can be made in our research and extension programs with the goal in mind of improving efficiencies, eliminating duplication, and striving to accomplish more with the same or possibly fewer dollars.

While the specific fundings decisions on projects from year to year are made in the Appropriations Committee, we intend to explore suggestions for how we can improve the process for identifying priorities and managing our research efforts, the ultimate goal being to insure the maximum return for our taxpayer dollars through research, education, and extension benefits on the farm and in the classroom.

During an era of shrinking Government resources, I believe that cooperative efforts, such as the public-private partnership reviewed in our previous hearings, are essential to leverage resources to the maximum extent possible.

However, I understand that our current system was not created overnight and should not be recreated in one single bill. As I have said earlier, our current research, education, and extension activities are still the best in the world. Our system is something to be very proud of.

With that, we must insure that whatever we do during this impending reauthorization process is truly helpful and a step in the right direction.

We have assembled a very large panel today that should serve to represent different views and perspectives. I believe that we on this side of the dais do not have all of the answers. That is where you come in and why we have enlisted the assistance and counsel of the witnesses scheduled before us today.

The subcommittee would also welcome the input from any other interested parties that have not testified before the committee.

In addition to the witnesses we have heard from in the three previous hearings, I would like to mention several organizations that have provided testimony for the record: the Alliance for Continuing Nutrition Research and Monitoring, the Farm A Syst and Home A Syst Programs, Kansas State University, Nebraska Grain Sorghum Producers Association, U.S.-Israel Binational Agricultural Research and Development Fund, Henry A. Wallace Institute for Alternative Agriculture, the Hispanic Association of Colleges and Universities, Council for Agricultural Research, Extension and Teaching, and the Eco Scrap Company.

With unanimous consent of members, I would like to keep the record of these hearings open until the 15th of August to receive any other written statements for the record, and without objection, it would be so ordered.

After that date, the printing of all the official record will proceed, but, of course, we will never stop talking to interested parties throughout this process.

Again, I appreciate very much your being here and look forward to your statements and would recognize Mr. Dooley.

OPENING STATEMENT OF HON. CALVIN M. DOOLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. DOOLEY. Thank you, Mr. Chairman, and I thank you for holding this series of hearings on a very important issue.

And I do not have a prepared statement. However, I did have the opportunity to read all of the testimony of the witnesses last night. That is kind of a commentary, I guess, on my life style, but I was struck by one of the statements there that I think Mr. Rose made that I think really sums up exactly what we are trying to do, and I will just go ahead and read it because I think it really captures my sentiments and what we are trying to achieve here.

We fear that simple reauthorization of the status quo will require an ever increasing amount of the static funding base to be allocated to maintenance of current physical and human capacity without examining whether the existing system is, in fact, appropriate and capable of addressing future problems and capitalizing on new opportunities.

I think that pretty much sums up what we are trying to achieve here, which is an analysis of the existing system and trying to understand what changes should be made so that we can be assured that the U.S. agriculture industry is going to be positioned in a way to capitalize on some of the market opportunities internationally.

And the only way that perhaps we can best position ourselves is to insure that our research base has the infrastructure and the capability to make sure that the industry has the tools and is on the leading edge of technology in order to be that competitor in that marketplace.

So I thank all of you for the time and effort you put into your testimony and look forward to a dialogue that can further, I think, illuminate some of the questions, as well as the answers, to how we reauthorize this research title.

So thank you all.

Mr. COMBEST. Mr. Brown.

OPENING STATEMENT OF HON. GEORGE E. BROWN, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. BROWN. Thank you, Mr. Chairman.

I do not like to reminisce about old times, but I was Chairman of this subcommittee when we adopted the goal of establishing the National Research Initiative. I have forgotten exactly when, but it was close to 10 years ago that we were actively debating how we could go about achieving this, why we needed a competitive program within agriculture, and we have not done any better since, and I am very unhappy about that.

The overall funding for agricultural research and extension has gone down. I think all of you know. In real dollars, it has gone down quite substantially. The $500 million that we originally anticipated for the National Research Initiative, we have never even come close to that.

Now, at the time, as I recall, looking around, the committee and the Congress were controlled by people who really did not get much benefit out of the National Research Initiative. They preferred the status quo, which provided for a strong flow of formula funding, and my guess is that those of you at that table may have a little schizophrenia about which benefits you the most sometimes.

But the point here is that if we are really serious about becoming world class, we are going to have to bring world class scientists and world class institutions into this comfortable, old agricultural research system, and we have not done that as well as we should.

And this is not belittling the excellence of the system that we have, but we have got to keep improving it. If we do not, we are going to suffer the consequences.

Now, I preach this little sermon not only to those of you in agriculture, but to most of the other research fields because it is true there as well.

We are declining in our investments in the future. I tried to reflect that this last year by offering my own budget, which I called an investment budget, which provided for precisely what some of you have called for in your testimony, a 5 percent increase in agricultural research and all other research so that we can at least remain level with the rate of growth in the gross national product, which requires about a 5 percent increase, and we have not done that.

We are declining in comparison with most of our advanced competitors. Now, you know that. We know that. The question is: are we willing to act to achieve that kind of a change?

And this is what I am listening for in hearing your testimony this morning. Frankly, we did not get a hell of a lot of support for that 5 percent investment budget. We got 93 votes on the floor. I would like to have a little more influence on some of those who voted on the grounds of basically pandering to the political popularity of a tax cut.

I like tax cuts, but if we are serious about making the proper investments and if we are serious about balancing the budget, we reserve tax cuts until we have balanced the budget and made the proper investments, and we are just not doing that. We are letting politics as usual run the show.

Thank you for allowing me to make that brief sermon, Mr. Chairman.

Mr. COMBEST. Amen.

If there are other statements from Members they may be included at this point in the record.

[The prepared statements of Mr. Canady, Mrs. Chenoweth, and Mr. Sanders follow:]

STATEMENT OF REP. CHARLES T. CANADY
SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION AND RESEARCH
HOUSE COMMITTEE ON AGRICULTURE
JULY 22, 1997

Thank you, Mr. Chairman, for this opportunity to testify on behalf of the National Citrus Research Council (NCRC) and its proposal for the reauthorization of the research title of the Federal Agriculture Improvement and Reform Act of 1996 (FAIR).

Mr. Chairman, the citrus-producing regions of the United States are facing a grave threat to their future viability. The Brown Citrus Aphid (BRcA), which is an extremely efficient vector for the Citrus Tristeza Virus (CTV), has recently been observed in Florida and Texas, having migrated into the United States from South America and the Caribbean. Experts say that it will only be a matter of time before Arizona and California are also affected.

I cannot exaggerate the potential danger that CTV poses to the citrus industry. Once a tree contracts either of the two strains of CTV that are carried by the BRcA -- the decline inducing (DI) or stem-pitting (SP) strains -- it will suffer greatly reduced fruit yield and a much-shortened life span. Over the past 70 years, CTV has been attributed to the deaths of tens of millions of fruit trees worldwide. We cannot allow this to happen in the United States.

In response to this threat, the citrus producers in the four major citrus-growing states created the NCRC with the goals of research, containment and eradication of the BRcA and CTV. The NCRC is a national response to a national problem.

Recognizing this fact, the House Agriculture Committee included in the FAIR Act an authorization in the amount of $3 million for FY97 for CTV research. As this subcommittee considers proposals for the reauthorization of the research title, I urge members to provide for a five-year authorization of this research, which will be conducted under the auspices of the NCRC, in the amount of $15 million.

Thank you, Mr. Chairman.

Statement of Representative Helen Chenoweth
Committee on Agriculture
Subcommittee on Forestry, Resource Conservation and Research
1300 Longworth House Office Building
July 22, 1997

I would like to thank Chairman Combest for scheduling this hearing today to review specific proposals for agriculture research reauthorization.

Additionally, I would like to commend the Chairman for holding this series of hearings to review our nation's agriculture research infrastructure. This has been most informative and helpful as we prepare to reauthorize the agriculture research programs.

Mr. Chairman, the Agriculture Committee has a duty to our nations farmers and ranchers to ensure that our agricultural research funds are well spent.

Agriculture research dollars must go towards projects which will help our farmers and ranchers, and better serve the needs of the consumers. We must be certain that for every dollar we invest in agricultural research, we get the maximum rate of return.

Programs like the regional/state **Special Grants Program** within the USDA Cooperative State Research, Education, and Extension Service are integral and have been responsible for promoting cooperation between the University of Idaho and numerous research facilities in the Pacific Northwest.

Mr. Chairman, as we prepare to reauthorize [illegible] agriculture research we must be sure to continue to promote programs like the **Special Grants Program** in Idaho where cooperation in the research field is encouraged and farmers and ranchers are able to maintain their competitive edge both here at home and in the global marketplace.

This is an extremely important issue, and I thank the Chairman for providing the opportunity to hear from this excellent panel of witnesses.

BERNARD SANDERS
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COMMITTEE ON BANKING AND
FINANCIAL SERVICES
[illegible]

COMMITTEE ON GOVERNMENT
REFORM AND OVERSIGHT
[illegible]

Statement of Rep. Sanders on Sustainable Agriculture Research and Education Before the Subcommittee on Forestry, Resource Conservation, and Research

Mr. Chairman, as the Subcommittee on Forestry, Resource Conservation, and Research considers the Department of Agriculture's research bill for re-authorization, I would like to stress the importance of the Sustainable Agriculture Research and Education (SARE) program. The Northeast regional office for the SARE program is housed at the University of Vermont and I know that they receive many times more requests than they can possibly fulfill. They have only been able to award grants to approximately 27 farmers in my state since 1993. In Vermont, membership in the Northeast Organic Farmers Association is at an all-time high of 600. Clearly, farmers in Vermont are converting to more sustainable methods--making SARE grants more readily available can only encourage more movement in this direction.

SARE is one of the most innovative programs in the USDA, partly because it strongly involves farmers and ranchers in the research conducted on sustainable farming methods. Not only does the SARE program provide grants to farmers and ranchers for research purposes, but it also helps the Cooperative Extension Service agents to educate farmers on sustainable methods, and offers grants to institutions and non-profit groups to research economically viable, environmentally sound, biologically integrated agricultural practices.

I know the Subcommittee has authorized SARE at $40 million and that the Clinton Administration only requested $8 million for the program. I hope the Subcommittee will continue to authorize SARE at least at this level. Currently, only about 17% of SARE grant requests are approved, not from a lack of excellent applications, but from a lack of funding. The SARE program has not had an increase in funding for the last two years--research and education receives only $8 million and the professional development program essential to providing extension services to farmers has remained funded at $3.3 million. The FY98 Agriculture Appropriations Bill unfortunately does not include an increase in this budget either. I would encourage the Subcommittee to continue to consider SARE a priority during re-authorization.

SARE has been important in assisting farmers develop more profitable techniques that preserve or enhance natural resources and that help support rural communities. Among the many benefits of SARE, it has helped farmers adopt new production methods that have allowed them to stay in farming. One success story includes over 500 Montana farmers adopting a more profitable and environmentally sound method of crop rotation after a SARE grant helped prove the technique's viability.

Through SARE, Congress should continue to assist those ranchers, farmers and others who are working hard to maintain their land with less chemicals, less pesticides, and by using the natural processes of our shared environment to complement agricultural output.

This is clearly a program that benefits our nation's farmers. It involves them in its research activities, it produces educational materials that farmers use and appreciate, and it makes grants directly available to some to adopt sustainable methods.

We can help farmers who are working hard to be good stewards of the land, who are attempting to diversify their crops, and who are looking to minimize adverse impacts on health, safety, wildlife, water quality and the environment. The research and education carried out through the SARE program not only assists farmers in the short-term, it helps our nation develop sound agricultural policies for the future.

I appreciate the Subcommittee's support of this program which is important to farmers and researchers in the State of Vermont and across the nation. I encourage the Subcommittee to maintain its support of sustainable agriculture in this re-authorization.

Mr. COMBEST. Let me introduce our witnesses who are at the table, and then we will proceed.

I would ask you, as is obvious. There is a large number of witnesses. We have your statements and have and will read them. If you could summarize them and/or add additional comments that you would wish and try to do that within a 5-minute period, the light in front of you will light up. When it goes to red, that has been 5 minutes, and I would certainly ask you if you could to hold it in that so that it gives us an opportunity for questions.

We probably do not need to introduce Dr. Robinson. We are going to have to get Dr. Robinson an office up here. He has been here for all of the hearings, and we appreciate that very much.

Dr. Robinson is Administrator of Cooperative State Research, Education, and Extension Service for USDA. Dr. Robinson is accompanied by Dr. Ron Phillips, who is the chief scientist for the National Research Initiative for USDA. I believe he is accompanied by Dr. Ed Knipling, who is the Acting Administrator of Agricultural Research Service.

Mr. William Knill is president of the Maryland Farm Bureau. Mr. Knill is here on behalf of the American Farm Bureau Federation.

Mr. David Erickson is president of the American Soybean Association.

Mr. Kenneth Rose is vice president for research and education for National Grain Sorghum Producers Association.

Mr. Tom Anderson is chairman of the small grains research and communications committee for Minnesota Wheat Growers Association.

Dr. Gary Weber is executive director of regulatory affairs for National Cattlemen's Beef Association. Dr. Weber is here on behalf of the Animal Agriculture Coalition.

Dr. Perry Adkisson is chancellor emeritus for Texas A&M University System at Texas A&M College of Agriculture, and also is a board member of the National Science Foundation.

Dr. Paul Gilman is executive director for the board on agriculture of National Research Council. Dr. Gilman is presenting the testimony of Dr. Bruce Albert, who could not be here today.

And, Dr. Robinson, I would begin with you, and we will just go down the table in that order.

Gentlemen, thank you very much. Dr. Robinson.

STATEMENT OF BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. ROBINSON. Thank you, Mr. Chairman, and I am certainly pleased to be here once again today in these important hearings to discuss the administration's position regarding the reauthorization of the research, education, and extension activities at USDA.

As you pointed out, I am accompanied by Dr. Ron Phillips, the chief scientist for the National Research Initiative, and later with your permission he will speak to one of our initiatives called the National Food Genome Strategy.

Also with me today is Dr. Ed Knipling, who will be here to respond to questions along with the two of us.

I come today to discuss what we believe to be the most critical Federal mission in agriculture research, education, and economics. The continued success of U.S. agriculture and, indeed, world agriculture is dependent upon knowledge.

Agriculture research and education have long been the engine of productivity in American agriculture, providing an affordable food supply, assuring our comparative advantage in many areas of production, and substantially contributing to our balance of payments.

But today the public demands even more of agriculture: to conserve the natural resource base, to create more nutritious and better quality foods, and to assure social and economic progress in agriculture and rural areas.

Policy changes, leading to changes in the structure of support for commodity producers, new international trade agreements and environmental regulations also position the agricultural knowledge system as a critical element in the new safety net for agriculture and rural America.

Two fundamental challenges face agriculture. First is how to achieve the long-term, sustainable agricultural productivity, while simultaneously achieving and maintaining profitability, minimizing negative environmental effects, and developing and improving strong rural and agricultural communities.

The second fundamental challenge facing agriculture is responsiveness to a broad public concern for safe, nutritious, and accessible foods. Recent legislation underlines that activity.

Mr. Chairman, as we have examined options for reauthorization of the research title of the 1996 farm bill, we do so in the context of a series of challenges that I have pointed out, and the administration has adopted 4 principles.

One is that USDA and the research mission area invest in creating and strengthening the research and educational capacity essential to meeting the national goals for food and agriculture.

Second, the programs of the mission area are dedicated to maintaining, as you pointed out, world leadership and excellence in agricultural science and education.

Third, the Federal Government has a distinct role to play in partnership with State and local Governments and the private sector.

And finally, a wise strategy for public investment supports a diverse portfolio of funding sources and mechanisms, as well as diverse institutions performing research, education, and extension.

We have several legislative proposals, and I will try to summarize those quickly.

First, we propose that Congress authorize a new competitive grants program to invest in a national food genome strategy comprised of the plant genome initiative and the animal genome initiative. The challenges facing agriculture both in the area of competitiveness and improving the interface with the environment and the natural resource base actually demands that we learn more, know more, and use more about our knowledge base in this area.

Dr. Ron Phillips will highlight this activity after I complete my remarks, with your permission.

Second, we propose that Congress reauthorize the regional aquaculture centers and the National Aquaculture Act of 1980, with the provisions that we establish private aquaculture as a form of agriculture for USDA programs, and that we extend the authorization of appropriations for regional aquaculture centers and the 1980 National Aquaculture Act, and that we establish a program to accelerate the transfer of promising research and technical advances, including environmental technologies to commercial aquaculture production.

Mr. Chairman, we also propose that Congress correct a technical flaw by providing funding for 1998 for the Fund for Rural America, in addition to the current funding for fiscal years 1997 and 1999. The fund is a multi-functional, multi-disciplinary, integrated approach to solving problems and fills many gaps in knowledge.

The current funding for the program has made available $100 million on January 1, 1997, and on October 1, 1998, October 1, 1999, and the amendment would move the funding back one year to insure that we have continuous funding over the length of the program.

We propose that Congress establish a new authority for an integrated applied research, extension, and education competitive grants program. This program would address national and regional issues and would require 100 percent non-Federal match for commodity or location specific activities.

This would allow us to integrate many of our current research and extension programs, such as the Sustainable Agriculture Research and Education Program and the IPM Program.

We propose that Congress also amend Smith-Lever (b) and (c) authority to require that not less than 25 percent of Federal extension formula funds be used for multi-State, regional, or national collaborative activities, including distance learning.

This recommendation parallels the requirement for the Hatch Act, which requires that 25 percent of Federal research formula funds be spent for regional research activities. It would require that we put in place an activity similar to the Regional Research Committees in terms of administering this program, but would allow significant leveraging of funds.

We propose that 'Congress consider flexibility to the system under two components: first, to amend the Smith-Lever Extension Formula Program and the Hatch Research Formula Program, to permit Land Grant universities to redirect up to 10 percent of their total research and extension formula funds to any research or extension purpose, and that would ratchet up we propose to 25 percent for fiscal 2001 and 2002.

In addition, we proposed that 25 percent of the appropriations above the 1997 level for research and extension be distributed to Land Grant universities in a single allocation, which would allow maximum flexibility at the option of the universities.

We propose that Congress amend the authority for international research, education, and extension activities to clarify the section as it applies to higher education and teaching, as well as research and extension.

We propose that Congress consider an amendment to the National Agriculture Research, Extension, and Teaching Policy Act of 1977 to permit the agencies to enter into cost reimbursable agreements with all universities and colleges.

We propose that Congress amend the National Agriculture Weather Information System Act of 1990 to establish a partnership between the National Weather Service and USDA, agricultural experiment stations and Extension Services, and State regional and climate programs.

The elimination in April 1996 of this program by the National Weather Service has caused significant hardship on the agricultural community.

We also propose that we amend Smith-Lever 3(d) to expand eligibility from 1862 Land Grant universities only to 1862, 1890 and 1994 Land Grant universities.

Additionally, Mr. Chairman, where competition is deemed appropriate to achieve the goals of the program, competition would be open to all Land Grant universities as well as other established colleges and universities.

We also propose that Congress amend the National Agricultural Research, Extension and Teaching Policy Act of 1977 to phase in non-Federal matching requirements for 1890 formula programs in support of extension and research. We have laid out more completely the Department's position in the written version of the testimony.

We also propose that Congress eliminate the matching requirements for equipment grants under the NRI to better enable capacity building activities at small universities.

Under the area of accountability, we propose that Congress require accountability for all USDA administered extramural research, extension, and higher education programs through the Government Performance and Results Act process to the strategic goals of CSREES and the mission area.

Section 1402 of the act would be amended to add five goals of the REE strategic plan, and it is the five goals I have spoken of before and are in the testimony and I will not repeat here.

A second section would be added to the purposes that describes management principles for USDA research, education and extension programs with accountability included as a principle.

We also propose that Congress require recovery of indirect costs for all competitively awarded USDA research grants and integrated grants be capped at 25 percent of the total grant award. This amendment would increase the current cap of 14 percent for indirect recovery costs for competitively awarded research grants.

Finally, we propose that Congress no longer consider our 1995 Blue Book proposal to establish a competitive grants program to fund university building and facilities projects. Our reasoning is that in moving to a cap of 25 percent for indirect cost recovery on competitively awarded research grants will partially eliminate the barriers that were created.

And, secondly, the 1996 farm bill established the strategic planning facilities task force to develop guidance for the Department relative to Federal support for research facilities.

Mr. Chairman, once again, I thank you for this opportunity to present the administration's position regarding reauthorization of title 8. That position is more clearly stated, and in more detail, in the written testimony.

And with your permission, I would like to turn to Dr. Ron Phillips, who would highlight, if you will, our proposed food genome initiative.

[The prepared statement of Mr. Robinson appears at the conclusion of the hearing.]

Mr. COMBEST. Certainly, Dr. Phillips, we will be happy to hear from you.

Let me just say thank you for presenting some very specifics about proposed legislative activity. That is helpful, and I assure you we will be working closely with the Department as we move forward. I think all of our goals are the same, and while not every area may be in total agreement, I assure you you will be a major player in the drafting of a final bill.

Mr. ROBINSON. We look forward to working with you, Mr. Chairman.

Mr. COMBEST. Dr. Phillips, please proceed.

Mr. PHILLIPS. Mr. Chairman, thank you for inviting me to discuss the administration's proposal for a national food genome strategy.

I am a regent's professor of agronomy and plant genetics at the University of Minnesota and chief scientist at the Department of Agriculture's National Research Initiative Competitive Grants Program.

Recently I was appointed as the chair of the Interagency Working Group on Plant Genomes by Dr. John Gibbons, science advisor to the President and director of the White House Office of Science and Technology Policy.

As you know, Mr. Chairman, genetics is the study of an organism's characteristics and the transfer of variations in those characteristics through heredity. A genome is a set of chromosomes located in plant and animal cells which contains the DNA material responsible for the determination of hereditary characteristics.

The administration's proposal for a national food genome strategy authorizes a competitive, merit based program for plant and animal genome and associated microbes research supported by $200 million over a 4-year period.

Mr. Chairman, genetics research over the past 100 years has led to significant improvements in plants and animals which has been translated into benefits for producers, but also for consumers. Unlocking the genetic secrets of plants and animals is critical to the future of U.S. agriculture.

The national food genome strategy promises to address the Nation's needs for identifying, mapping, sequencing, and manipulating the genes responsible for those traits that are economically important to agriculture. Investment in a national food genome strategy will build on research work USDA is already doing in genetics.

Most everyone is aware of the important advances in understanding the structure and function of genes in humans. Similar advances also have been made for agriculturally important plants and animals.

One of the useful aspects of genetics has always been that the theory applies across organisms. We have entered a new era of understanding, however, on how gene content and even gene order are similar within broad groupings of species. For example, we now know that if a gene is located on a chromosome of rice, the cereal with the lowest amount of DNA, the occurrence in chromosome position of the gene often can be predicted in other grasses, including corn, sorghum, wheat, oats, barley, rye, sugar cane, millet, and even a forage grass at this point.

USDA scientists and researchers from State agricultural experiment stations and elsewhere have produced genetic maps of important animals like cattle, swine, sheep, and poultry, and plants, such as corn, soybeans, wheat, sorghum, and others.

But these maps and the underlying techniques need to be expanded and improved before their full potential can be applied to new crop and breed development. Additional gene tagging work is needed for all of the agriculturally important species.

In plants and animals, continued work is needed to improve the resolution of the various maps and isolate genes that govern desirable traits. Even as a plant geneticist in the middle of genome research, I am amazed to think that we now have within reach the possibility of knowing every gene in an organism.

The task at hand is not only to know the DNA structure of each gene, but also to know its product, how the synthesis of its product is controlled, how that product affects the organism. We also need to learn how to efficiently manipulate these genes so that we can better improve the plants and animals on which we depend and to be able to respond more rapidly to crisis situations, such as the occurrence of a new disease.

There's increasing demand also for crops designed for special purposes, such as corn that will give greater swine or poultry productivity. Genomics research will greatly facilitate development of such new products.

The national food genome strategy will be designed to understand and map genetic traits of importance to agriculture. A small set of plants, animals, and microbes would be selected on the basis of their importance to agriculture and their scientific advantages and relationships.

The competitive grants program proposed by the administration will be part of a multi-agency program with USDA as the lead agency and with efforts to take advantage of international cooperation and public-private partnerships.

Access to genetic information through gene sequencing and mapping and other research is vital to the future health of American agriculture and forestry. The development of economically, environmentally, and nutritionally important traits will be much more dramatic if the scientific community has ready access to the needed genetic data. The goal of open access to data is fundamental to the program.

With this new level of understanding, that what we have learned in one species can be more directly applied to another than previously presumed makes it timely to develop a coordinated genome strategy to achieve the greatest return on the investment and maximize advancements in agriculture.

Mr. Chairman, I would be happy to answer any questions you have about the national food genome strategy.

Mr. COMBEST. Thank you, Dr. Phillips.

Mr. Knill.

STATEMENT OF WILLIAM KNILL, PRESIDENT, MARYLAND FARM BUREAU, ON BEHALF OF THE AMERICAN FARM BUREAU FEDERATION

Mr. KNILL. Thank you, Mr. Chairman.

My name is Bill Knill. I am a Maryland farmer. Our farm consists of a very diversified operation that includes beef, small grains and corn, and we have a vegetable production operation and sell at a farm market.

I also serve as Maryland Farm Bureau president. I am pleased to speak to you today on behalf of the American Farm Bureau Federation.

Mr. Chairman, when I think about the future of our agriculture research system and the contributions this system has made in the past, it would be easy to request a simple reauthorization, but that would also be ignoring the fact that recent changes in agriculture policy, both domestic and global, will increase the need for greater output from the system and increase cooperation among all public and private research and extension organizations.

It is paramount that all Federal research, extension and education funds be administered in a system that provides greater accountability and is relevant to the problems currently facing agriculture.

Most of Farm Bureau's recommendations focus in some form on the three issues we believe to be most important to the debate: adequate industry input through the priority setting, budgeting, implementation, and review stages, along with relevancy and accountability.

If these issues are addressed, we believe the opportunity to secure increase in funding requests in the future is more likely.

Let me highlight some ideas on each of these issues.

Industry input. If industry input and the structure and responsibility of the advisory board can be enhanced, we believe it will insure more relevancy and accountability. To that end, we recommend that the majority of the members of the advisory board consist of producers or industry representatives.

We also suggest a wider variety of priority setting mechanisms be forwarded to the advisory committee for their consideration rather than the current practice of having them only evaluate the REE strategic plan.

In addition, we believe each Land Grant university or other non-Federal recipient should be required to establish and implement a process for obtaining stakeholder input concerning the use of funds prior to them receiving Federal funds for agricultural research and extension.

The relevance. A standard should be established for federally funded, competitive, and intramural agricultural research.

Extension and education. The research should address high priority topics which are based on priorities set by the National Advisory Board, with significant input from stakeholders.

In addition, there should be a merit review of each extension and education project competitively funded by the Federal Government.

Accountability. For research activities, Federal funds should only be spent if the project has undergone an independent, scientific peer review. For extension and educational activities, Federal funds should only be spent if the project has undergone an independent merit review.

Also, those who receive Federal funds should be required to submit a report annually describing the results of the activity and the merit of the results.

We also believe the Secretary of Agriculture should develop guidelines for insuring the performance of research and extension to determine whether the federally funded programs result in public goods that have national or multi-State significance.

Mr. Chairman, I would like to focus the rest of my oral testimony on our suggestions for changes in the Fund for Rural America. We suggest it be used for a limited number of priorities which address complex problems, which require a significant initial investment, cooperation, and collaborations between the private and public sectors among State and Federal Government organizations, between Federal and university research facilities, and among diverse academic disciplines.

We believe this approach, when coupled with the resources from other research programs, can yield significant results in the shortest amount of time on topics important to the future of U.S. agriculture without reducing our ability to address existing research priorities.

In addition, this design can build a constituency for the fund and encourage its review as a potential model for insuring greater cooperation and accountability within all agricultural research endeavors.

We recommend extending the authorization for the fund from fiscal year 1999 to fiscal year 2002, with the annual authorization of at least $50 million for rural development and $50 million for research, education, and extension programs.

In order to get the new program underway and hopefully avoid unnecessary delays in funding of grants, we propose that for fiscal year 1998 and 1999 the entire $50 million for research, education and extension would be spent on the following six priority areas, with equal funding for plant and animal projects:

National food genome project; Food safety and quality; maintaining and enhancing the environment; economically significant value added products; international competitiveness; and precision agriculture.

For Federal year 2000 and thereafter, the advisory board will designate no more than 6 priority areas for the fund that are consistent with the national priorities identified by the board.

We suggest the advisory board establish a panel for each of the 6 priorities to recommend to the Secretary of Agriculture the desired projects to be solicited and in a request for proposals under the fund.

The panel should include representation from the advisory board, as well as farm and commodity groups, private industry, universities, private research organizations, and Federal agencies.

In order to further improve stakeholder input, we recommend the Secretary publish a request for the proposals in the Federal Register. A competitive merit review process to select the projects to receive the grants should be established.

Priority should be given to projects that leverage funds from other Federal, State, and/or private sources to those who integrate research, extension, and education in their proposals.

In summary, we believe a strong constituency for the program can be built by modifying the fund in the manner suggested.

I close this morning with a point that represents a belief that many farmers have expressed many times. We believe agriculture has already sustained many billions of dollars in cuts to farm programs. This has been done with the understanding that a significant portion of these funds would be reinvested in programs that could give us a better chance to be competitive in the increasingly competitive global agricultural economy.

We took that as a commitment and will work hard to see that this commitment is met. We believe it is now time for Congress to honor its commitment to the American farmer. There are many reasons to be excited about the future of production agriculture, but we will not realize that bright future and compete as effectively as we can and should if we do not have the benefit of a strong food and agriculture research, education and extension program.

We ask for your help. We are eager to assist you in your efforts to craft a research title that insures a growing and efficient food and agriculture system for the United States in the 21st century.

Thank you for your time.

[The prepared statement of Mr. Knill appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, sir.

Mr. Erickson.

STATEMENT OF DAVID ERICKSON, PRESIDENT, AMERICAN SOYBEAN ASSOCIATION

Mr. ERICKSON. Thank you, Mr. Chairman.

I am David Erickson, a soybean and corn producer from Illinois and president of the American Soybean Association. Thank you and the committee for allowing me to provide testimony today.

Before being elected president of ASA, I also had the opportunity to take on other responsibilities, which included being chairman of our research committee, and while ASA does not fund research per se, we do set research priority policy for soybeans, and we work with State and national soybean checkoff boards in developing priorities for funding using producer dollars from the soybean checkoff system.

And in fact, as you know, soybean producers support that system, the soybean checkoff system, that spends about $12 million on an annual basis on research, and in my State alone, the State of Illinois, a State checkoff board that also spends another $3.5 million annually of farmer dollars on research, research that is a priority for soybean growers, and we think is a good investment for producers and for our Federal Government, as well.

State organizations across the growing region have developed individual, yet coordinated processes for work from Federal, State, and Land Grant institutions with those dollars, and we also worked with private companies and continue to expand that work in setting research priorities and helping develop guidelines for Federal funding as well.

We think it is important that we use producer dollars from the checkoff system to help leverage dollars invested by State and Federal Governments. For example, there is a group of 10 southern soybean producing States that work on an annual basis developing priorities and carrying out those priorities in funding research for the benefit of producers in that area, as well as eight north central U.S. soybean producing States that do the same thing on an ongoing basis to see that they are using producer dollars to help direct dollars at other levels, as well as even combinations down to bi-State efforts like there are now in Illinois and Iowa to help address research needs and priorities there, as well.

Some of the projects that have been targeted through these processes include such things as accelerating transformation and regeneration of the soybean gene, combatting major problems, such as soybean cyst nematode and white mold.

Producers in all States are doing a good job of identifying State and regional research needs and setting priorities. However, there is still a strong role for the Federal research system to assist in identifying national needs and priorities.

The USDA research system must also keep up with many changes in agriculture worldwide. As has been mentioned before, we are in a new era where we export or desire to export more of the crops that we produce. Because of a growing world and the fact that the U.S. soybean crop is one-half exported, we think it is not time to shy away from our investment in research, but continue to invest in it to increase our ability to compete on a worldwide basis, and we are going to do that with new technologies that we have developed and further enhanced through agricultural research.

One example that has been talked about before is genome mapping, and certainly it is something that is important for soybeans, a crop that is not a hybrid and is one that could make significant advancements through mapping of genes and, we think, certainly something that the Federal Government should play a significant role in.

Another key area is biotechnology. Although much of this current research is done in the private sector, as producers we feel the country's best interest might be served in having some basic biotechnology research at the Federal level as well, public research that is available to many users throughout the system.

There is also a strong need for Federal dollars going in commercialization of value added new uses research. We have done a pretty good job of that in the past. We need to see that that emphasis continues in the future. As we add value, it does nothing but enhance income to not only producers, but processors and developers of products on down the line.

There are other areas where a Federal research system must respond to agricultural needs, including bringing precision farming into all producers, and I think the reason we might get involved in a Federal level is to make sure that we are sending consistent messages to why precision agriculture is important to producers and consumers alike.

We need to continue to get that sort of input on these issues by obtaining more direct input from producers in the process, and certainly the make-up of the National Agricultural Research, Extension, Education and Economics Advisory Board is a good place to start.

The American Soybean Association feels that more than half of that advisory committee should be made up of representatives from production agriculture and the agribusiness community. We feel that it is vital that we play more than a 50 percent role in reviewing that process because, quite honestly, we do not feel that those institutions should be reviewing themselves.

Another area where producers can have input also is to gain information through the Extension Service, and while I am sure you have heard a lot about the Extension Service and different opinions, it is a good system that works in varying degrees in varying States throughout the country.

We think there needs to be more emphasis put there, and in fact, we are even suggesting that while you cannot direct how dollars are spent on the State and local level, certainly we think that Federal dollars in the Extension Service area should all go to production agriculture to see that there is a sound base system developed for production agriculture through the extension system.

Certainly there are other issues that you will look at as you continue to reauthorize the research title. In order to keep my time limit here, I want to make sure to point out other documents that we have presented and also submit comments on behalf of the National Cotton Council.

In closing, there is no doubt that the U.S. agricultural research system is a good one and probably one of the best. That does not mean that there does not need to be improvements made in the system and certainly improvements made that can be positive through the Federal system that are positive for both producers and consumers in making our system most responsive to world agriculture as it is developed today.

We do need to see that facilities and the institutions and researchers are input so that basic research is carried out so that that next breakthrough that provides production agriculture the ability to meet the needs of the future are maintained.

This concludes my statement, Mr. Chairman. Thank you for your time.

[The prepared statement of Mr. Erickson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Mr. Erickson.

All of your statements and information which you may have with you will be made a part of the record, and any information that you would wish to submit after today will also be made a part.

Mr. Rose.

STATEMENT OF KENNETH A. ROSE, VICE PRESIDENT FOR RESEARCH AND DUCATION, NATIONAL GRAIN SORGHUM PRODUCERS ASSOCIATION

Mr. ROSE. Thank you, Mr. Chairman.

Mr. Chairman, members of the committee, I am Ken Rose. I produce wheat and grain sorghum, as well as run a cow-calf operation on my farm near Keyes, OK.

As vice president for research and education for the National Grain Sorghum Producers, it is a pleasure to appear before this committee on behalf of that organization and the National Association of Wheat Growers, National Barley Growers Association, and the National Corn Growers Association to discuss this reauthorization of the research title to the 1996 farm bill.

As producers, we, along with our partners of production agriculture, namely, input suppliers, handlers, processors, and merchandisers, have all benefitted significantly from the public and private investment in our agriculture research system, as have consumers in the United States and abroad. We have and continue to support increased funding for agricultural research which has consistently produced a return on investment greater than 35 percent.

Unfortunately, current budget realities suggest that increases are unlikely. Reduced Government production and market controls, the need for accelerated yield growth, and increased concern over issues such as biotechnology and environmental enhancement are real challenges which must be met. The reauthorization process provides an opportunity to review these individual system components, examine ways to improve efficiency, and make timely adjustments to maximize productivity into the next century.

We believe five areas should be addressed in the new legislation:

Funding mechanisms and allocation;

Institutional collaboration and cooperation;

Industry input in determining research relevancy and priorities;

System accountability; and

Addressing future opportunities.

Institutional collaboration and cooperation can be enhanced by requiring that Federal research expenditures be limited to projects that address national or multi-State priorities. We believe Federal support of extension should be dedicated to issues of economic importance to production agriculture.

Congress should consider combining a significant portion of research and extension funding into a single allocation to encourage full mission and priority integration of these two disciplines. This will improve information dissemination and establish outreach programs that reflect the current state of scientific knowledge.

The current research information system, CRIS, should be improved and full utilization made of new communications technologies to exchange information and improve the level of cooperation among various research entities.

The National Agricultural Research Extension, Education, and Economic Advisory Board was established in the 1996 farm bill. The formal structure of this board is such that a significant number of board members come from the system the board was established to advise.

In addition, the overall size of 30 members makes it difficult for the board to function efficiently in a proactive advisory capacity.

We suggest that this board should operate in a quasi-independent capacity as a resource to both the USDA and to the appropriate committees in Congress. We believe the systems' primarily stakeholders, comprised of producers, input suppliers, handlers, processors, and merchandisers, should be in the position to drive this advisory process by requiring that at least 50 percent of the total board membership represent production agriculture.

In our full testimony we identify specific modifications to the board which will reduce the size to 18 members without disenfranchising those whose terms have not expired, and we recommend an appointment procedure in which the Secretary of Agriculture, the House Agriculture Committee, and the Senate Agriculture Committee will each select an equal number of board members.

Finally, we propose an expansion of board duties to include the development of short and long-term priorities for each of the system mission areas, as well as the National Research Initiative and the agricultural research portion of the Fund for Rural America.

The board should establish a procedure to insure the relevancy of Federal research projects and should conduct reviews of the USDA REE strategic plans and mechanisms for technology assessment.

The board should also perform financial and performance audits of Federal research projects consistent with the Government Performance and Results Act. This activity will improve system accountability and strengthen its grassroots support.

We also support the creation of a funding review task force similar to the facilities review task force which would be charged with:

One, comparing the adequacy and efficiency of existing funding components;

Two, providing an analysis of the funding levels and requirements for each USDA REE mission responsibility;

Three, reporting on opportunities to obtain funds from outside traditional USDA sources; and

Four, developing recommendations for changes to the existing funding mechanisms, including capital expenditures.

In conclusion, Mr. Chairman, we believe that exciting opportunities exist in several priority areas to provide a positive impact throughout production agriculture. Although research funds are limited, we believe the new money for research which is provided through the Fund for Rural America should be used to address a limited number of big ticket, high priority issues.

In this regard, we would like to associate ourselves with the specific comments concerning the Fund for Rural America offered by Mr. Knill of the American Farm Bureau Federation.

Mr. Chairman, I would like to once again thank the committee for the opportunity to participate in this hearing. Please be assured that the organizations I represent stand ready to provide any assistance they can to the committee as they proceed in reauthorizing this research title.

Thank you, sir.

[The prepared statement of Mr. Rose appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Mr. Rose.

STATEMENT OF TOM ANDERSON, CHAIRMAN, SMALL GRAINS AND RESEARCH AND COMMUNICATIONS COMMITTEE, MINNESOTA WHEAT GROWERS ASSOCIATION

Mr. ANDERSON. Thank you, Mr. Chairman.

My name is Tom Anderson. I am from Barnesville, MN. I grow wheat, corn, soybeans, and sugar beets.

I have submitted remarks for the record and will try to summarize those remarks so that there is more time for questions. I will summarize by making five points.

Point No. 1. It is interesting to note that as the reauthorization of agriculture research programs is being reviewed, several changes are being proposed. Among the changes is the idea of establishing research priorities through advisory committees whose membership would include farmers, business representatives, and researchers.

We do this in Minnesota through the Small Grains Research and Communications Committee, of which I am the present chair. This committee has served in an advisory capacity to the State wheat and barley production sector and their councils, the checkoff group, since 1992.

Research progress is communicated to the public by crop scientists who participate in a research reporting session each November. I feel this committee has been an efficient vehicle for not only prioritizing the money that I invest in research, but also for the communication to the producers who are the stakeholders.

Point No. 2. More regional research and collaboration has also been suggested, with Federal agriculture research funding targeted to priority projects of multi-State or national relevance.

Being from Minnesota, this brings up the problem of scab and vomitoxin in wheat and barley. Until 1996, the problem of scab had pretty much been confined to Minnesota, North Dakota, and South Dakota, but in 1996 it hit areas of Michigan, Indiana, Illinois, and other wheat growing areas as well.

Because the problem of scab and vomitoxin has spread as it has, I think it fits this new regional and collaborative parameter, as well. Scab or fusarium head blight is a fungal disease that can severely reduce production and quality of wheat and barley and create difficulties in marketing, exporting, and feeding, as well as processing.

The scab fungus can produce a toxic contaminant called deoxynivalenol or vomitoxin. Humans and some animals can get sick from vomitoxin if consumed in concentrated amounts.

Thus, vomitoxin is a food safety issue. During the last harvest, the harvest of 1996, vomitoxin created marketing concerns at the Chicago Board of Trade. Vomitoxin is a high research priority for the U.S. milling and malting industry, and recently the Millers National Federation made a decision to help fund research of vomitoxin, together with the Agricultural Research Service.

At this time I would like to pass around some head samples of wheat that I pulled from my farm on Sunday. This is the fifth consecutive year that we have been affected by scab, and as Mr. Robinson pointed out earlier, scab does threaten the wheat and barley production, sustainability, and profitability in all of those States that are affected.

Point No. 3. Recently a study was completed by Promar International on behalf of the National Association of Wheat Growers. The study concluded, among other things, that losses associated with scab exceeded $1 billion in 1993, the year that was studied.

The study also concluded that scab constituted a serious threat to the future of the wheat industry in the areas vulnerable to the disease.

Point No. 4. Crop scientists from States affected by scab and vomitoxin met last spring to coordinate research priorities. Federal funding aimed at scab and vomitoxin would enable researchers involving 12 Land Grant universities to study in a coordinated effort food safety concerns and post-harvest management of infected grain, evaluated effective crop treatments and sprays, and, most importantly, develop more resistant germ plasm in crop breeding material.

Now about 40 State and national groups representing farmers, grain millers, bakers, retailers, grain exporters, and the U.S. seed industry have joined to recommend that Federal dollars be allocated to research the scab problem.

The group advised a Federal investment of $5 million for 5 years, which would be one-half of 1 percent of the $1 billion in economic losses from scab in 1993 alone.

Mr. Chairman, at this time I would like to ask if a copy of the cooperative project entitled "Securing the Food Safety and Sustainability of Wheat and Barley Industries in the North Central Region of the United States" may be entered into the record, along with my testimony, as it more completely outlines the proposal I just talked about.

Point No. 5. It is unfortunate that this U.S. wheat and barley industry priority was insufficiently addressed during the FY 1998 appropriation process. However, authorizing legislation has been introduced by Representatives Debbie Stabenow and Roy Blunt, along with others, that would develop a cooperative project between 12 Land Grant universities and the Federal Government to address the problem of scab and vomitoxin in wheat and barley.

We are hopeful that this legislation will gain congressional support.

In closing, I would like to think that the scab problem has brought together several different sectors of the United States wheat and barley industry to try and solve the problem. Perhaps the scab and vomitoxin project can be used as a template to build a better public research mechanism: a Federal investment to address a broad based problem with research components prioritized by an advisory committee consisting of public and private members and coordinated in an efficient manner through the Land Grant university system.

Mr. Chairman, members of the subcommittee, I will just pass on that.

At this time I would like to thank you for your time and attention and answer any questions when the time allows.

Thank you.

[The prepared statement of Mr. Anderson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Mr. Anderson.

Dr. Weber.

STATEMENT OF GARY WEBER, ON BEHALF OF THE ANIMAL AGRICULTURE COALITION

Mr. WEBER. Thank you.

Good morning, Mr. Chairman and members of the subcommittee. My name is Gary Weber. I am the executive director of regulatory affairs for the National Cattlemen's Beef Association, and today I am representing the position of the Animal Agriculture Coalition.

The coalition members that we work with very closely, their livestock and livestock products represent over 50 percent of farm and ranch income in the United States. These are value added products which contribute to the vitality of rural communities.

In fact, animal agriculture contributes directly more than $100 billion in farm and ranch cash receipts annually.

Now, livestock producers must meet high expectations of consumers for safe, wholesome, and affordable food, and at the same time, we must address the public's concerns regarding the impact of agriculture on the environment, food safety, and simultaneously maintain profitability and be competitive in a global market.

To meet these challenges, we need the support of Federal Government investments in agricultural research and extension. Previous investments have produced a more than offsetting return to the taxpayer in terms of safe, low cost, wholesome food, increased business activity which results in vitality of rural communities, and there have been a number of studies which have documented the economic return to the taxpayer for these previous investments.

As we discussed this issue in our group of research extension and teaching, we believe that the system is certainly not broken, but it is at risk, and we cannot allow the system to deteriorate, and it is our collective responsibility to insure that this system, which is the envy of the world, makes the necessary changes in order to remain viable into the 21st century.

If we look at the return on investment, if we look at what our competitors are investing in terms of agricultural research, we are by no measure or means spending enough to support research, extension, and education in the United States.

But this system is at risk, and through our deliberations we have identified four areas which raise our concerns.

One is we see a research agenda which is not focused on a coherent set of priorities.

We see a teaching curriculum which is struggling to remain relevant to the changing needs of the agricultural sector.

We see evidence of an extension system that has blurred its agenda to accommodate the political demands of urban-suburban votes while in some ways sacrificing its relevance to agriculture.

We see Federal funding for agricultural research, extension, and education systems becoming more of an afterthought, and we have got to address all of these issues.

As we have talked about these issues in our groups, what we have come down to is one common denominator: that we have really a problem with the partnership that exists. The strength of the system has been in the partnership between research, extension, Federal, State, local Governments, farmers and ranchers, scientists, veterinarians, and the general public.

We have seen over time, slowly but surely, the commitment to and cultivation of this partnership has diminished. One symptom of that breakdown has been the concerns about relevance and accountability, and we hear a lot about the need to address that.

You listened to our concerns and established the REE Advisory Board as a way to get at some of these problems of the loss of the partnership, but now we are thinking that the problem is not for the advisory board to look and establish the priorities, but to spend time on the very foundation of it, reestablishing the partnerships that exist in this system because without that, we are not going to have the kind of relevance and accountability that we all need and expect.

We have listed in our document that we have presented to you a few recommendations that will enhance the transparency and enhance our involvement beyond what we believe the REE Advisory Board should do, which is manage a process, work with the FAIR 2002, and Crops 1999 priority setting processes, but we think as the competitive grants and special grants proposals are drafted in USDA, these ought to be published in the Federal Register for notice and comment.

In addition to that, as the Government Performance and Review Act compliance criteria are developed by USDA, we want to see those. We want to have an opportunity to comment on those to make sure we have adequate opportunity for input, to be a partner.

Also, before formula funds are distributed to States, we would like to see the criteria that are required for the States to submit to the USDA before those formula funds are released, and we would like to comment on those.

Also, there has been a lot of discussion about the development of a 2-tier project, a review project for scientifically valid and meritorious projects. Tier 1 would involve a review by scientists and producers who would make a first cut based upon relevance, and we recognize though that the second cut, to establish the very best science, requires a more significant involvement of the scientists.

We think these changes will improve the transparency of the priority setting system.

If we look at the funding structure, we certainly think that the balanced portfolio approach where we have formula funds, competitive grants, special grants, and intramural funding is very appropriate. It has been one of the reasons for the success of the system.

However, as the research title is reauthorized, we hope that there will be an opportunity to dialogue on what "contemporary description of the roles, mission, policy, and priority setting framework are for each of these components." We think there needs to be a more contemporary composition of those.

And one other important point that we feel we need to share with you is that relative to funding of research, we continue to be very concerned about the tendency for Federal regulatory agencies to pursue authorization and appropriations to support their own research and education efforts. We support the current REE system as the primary research, extension, and education arm of USDA, and that the REE programs should continue to meet the research needs of regulatory agencies.

We think that there are a couple of key areas that I would like to touch on that are of very great importance to us. One of the most frustrating and reoccurring challenges farmers and ranchers face is getting quick action to resolve emerging food-animal health issues, very similar to what the crops industries framed with vomitoxin and other things.

In our world, tuberculosis, porcine reproductive and respiratory syndrome, Johne's disease, the transmissible spongiform encephalopathies that we have heard a lot about this past year are just a few examples that we really need to have funding to cut off these emerging diseases, to deal with them promptly, and this is of great importance as we look at preventing non-tariff trade barriers and assuring that U.S. agriculture remains competitive in the world market.

In closing, I would like to say one other key element of this partnership that we want to focus on is additional resources that are used to establish integrated production demonstrations, conducted in partnership with real world commercially farms. We encourage establishing these partnerships with private commercial operations, with Federal and State and local Governments contributing matching funds.

We would like these demonstrations to validate the applicability of new technologies, methods, and practices in real world settings. These projects would demonstrate that research and education can be integrated at the producer level to insure food safety, improve profitability, protect public health, improve animal health and well-being, protect the environment, stimulate rural communities, and expand our export of products.

Thank you very much for this opportunity to share these concerns and recommendations to you today.

[The prepared statement of Mr. Weber appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Weber.

Dr. Adkisson.

STATEMENT OF PERRY L. ADKISSON, CHANCELLOR EMERITUS, TEXAS A&M UNIVERSITY SYSTEM, TEXAS A&M COLLEGE OF AGRICULTURE, AND BOARD MEMBER, NATIONAL SCIENCE FOUNDATION

Mr. ADKISSON. Thank you, Mr. Chairman and distinguished members of the committee.

My name is Perry Adkisson. I am retired chancellor of the Texas A&M University System, and prior to being chancellor, I served several years as deputy chancellor for agriculture, was in charge of the agricultural research, teaching and extension activities system. Prior to that I was head of the Department of Entomology for 11 years, and I have been a professional researcher involved in crop protection for almost 40 years.

In addition, I served 2 terms on the National Science Board, but I do not represent the National Science Board here today. I am a past member.

I am retired. I am not engaged in any research activities, but I do own a cotton and soybean farm. So maybe that gives me enough experience that I might bring some perspective to the Congress today. The views I present are my own and not of any of the entities that I have been associated with.

I just wanted to stress the need today for the importance of increasing support for agricultural research by formula and special grant funding, recognizing that might not be the most favored position to take.

Although there has been substantial increase in funding in recent years for the National Research Initiative at the U.S. Department of Agriculture, there has been an overall decline in State and Federal funding in real dollars for production oriented research.

Now, the National Research Initiative is an excellent program. It is one I have supported for years, but I want to say it does not meet all of the research needs of our food and fiber production system.

The NRI is a competitive grants program which supports the basic biological sciences, especially biotechnology, that are important to agriculture. The programs are administered in a manner very similar to that of the National Science Foundation, where small grants, typically $100,000 to $200,000 per year, are made to single investigators for periods of 2 to 3 years.

Now, these grants are great. They are great for building blocks of knowledge which may later be used to advance a specific field, but they are not designed to solve problems of immediate practical importance to the agricultural production system.

For this purpose formula funding for special grants are needed. Because of the decline in funding, many talented and production oriented agricultural scientists, the plant breeders, the animal breeders, the plant production specialists, agronomists, the animal scientists, agricultural engineers, and these types of people are underfunded and underemployed. You cannot deal with a sudden unexpected pest or disease outbreak or develop better crop varieties or better food animals or superior trees with a 3-year grant that might not be renewed.

These types of programs require continuous and stable funding for long periods of time, such as provided by formula funds.

Also, funds are practically nonexistent for new, large regional and national problems that can best be solved by a multi-university, multi-disciplinary approach. Problems of these kinds may be highly complex and can best be solved by assembling a large number of scientists of various disciplines in a highly focused, centrally managed effort requiring several millions of dollars per year.

The competitive grants program does not meet this need, nor should it. These needs can best be met by a special grant program where you can choose the best institution and scientists to be involved in the research.

I want to use two examples of the need for special grants that are not being met by the other funding sources. The first involves the need for reducing pesticide use on fruits and vegetables, and the second present the possibility of greatly reducing the risk of diet related diseases.

Now, great concern has recently been expressed about the need for reducing levels of pesticide residues on fruits and vegetables, and especially for those consumed by infants and children. I believe from my experience as a crop protection specialist that it is possible that we could develop the technology over the next 10 years which would reduce pesticide use on these crops by 50 percent or more.

But this could be accomplished by assembling a multi-disciplinary team in the State agricultural experiment stations in 7 or 8 of our largest fruit and vegetable producing States. The scientists would have to be chosen on the basis of their expertise and managed in a highly focused manner with well defined goals and objectives and would require a budget of $8 to $10 million per year.

Now, the best and perhaps only way this research could be funded is by a special grant. I do not believe there is any funding mechanism to do that today.

The second example involves an exciting new possibility of reducing the risk of certain diet related diseases, and this could have enormous benefit to society and individual consumers.

Five diet related diseases, certain types of cancer, coronary heart disease, stroke, atherosclerosis, and diabetes are leading causes of death in the United States. These five diseases are responsible for approximately two-thirds of the more than 2 million deaths that occur in the United States each year.

Since the diseases are diet related, it ought to be possible to prevent them, delay their onset, or lessen their severity through dietary changes. There is a growing scientific body of evidence, and you cannot hardly pick up a paper that you do not read, that somebody has discovered that something in some fruit or vegetable can have an effect on tumors or heart disease or stroke.

For example, there are compounds in cauliflower and broccoli that can aid in the prevention of prostate cancer, and there are compounds in garlic and onions that can inhibit tumor formation in esophagus, colon, and rectum. There are compounds in other vegetables and fruits and soybeans that are active in the prevention of certain cancers, coronary heart disease, and atherosclerosis.

But it is surprising that with so much of this data becoming available on the identity of naturally occurring compounds in food plants that may aid in prevention of these most serious diseases that there is almost no work being done to enhance these characteristics by modern plant breed and electrogenetic methods.

What we need to do is link the premier medical research centers working on this problem with the premier agriculture centers so that we could identify the compounds that could prevent disease, and then we could develop ways to enhance these compounds in the foods that we eat.

We know that these foods have therapeutic compounds, but to do this would require several millions of dollars a year. It would be a highly complex and long-range program, and the only way you could get a program of this type funded would be to go to Congress.

I would hope that Congress in its wisdom will continue and will increase formula and special grant funding, and please remember that there are many worthy agricultural research needs that do not fit the competitive grants mode, and there are many large projects that can only be funded by congressional appropriations.

So I would urge you in your deliberations to consider the needs of all agriculture and increase special grant formula funding for the applied research needs of our food and fiber production system.

Thank you very much for allowing me to be here today.

[The prepared statement of Mr. Adkisson appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you, Dr. Adkisson.

Dr. Gilman.

STATEMENT OF PAUL GILMAN, EXECUTIVE DIRECTOR, BOARD OF AGRICULTURE, NATIONAL RESEARCH COUNCIL

Mr. GILMAN. Thank you, Mr. Chairman and members of the committee.

We appreciate the opportunity to present this testimony.

As many of the witnesses have pointed out, our ability to capture the growing world market for agricultural products will rely heavily on our ability to utilize our research in both science and engineering. Many times before the representatives of the National Research Council have spoken to you about the importance of the competitive grants program, which has been authorized, and once again, we would urge you to fund that program at the levels that have been authorized by the prior Congresses.

I am here today to speak specifically to a report that was released at the end of the last Congress looking at the colleges of agriculture in the Land Grant universities and specifically asking the question whether they are still relevant, given the dramatically changing client base they serve and the fact that there has been little change in the institutional arrangements for the Land Grant colleges since their inception.

This work was funded by a grant from the Kellogg Foundation and from funding from the U.S. Department of Agriculture.

A consensus committee that we put together consisting of almost half the members from Land Grant institutions, including 1890's institutions, the private sector, and public interest groups, concluded that, in fact, the national science and education infrastructure underlying our food and agricultural system is still in the national interest, as is Federal funding for it.

They did conclude though that changes were needed, and those changes have been spoken to by a number of the witnesses already today. The relevance of the contemporary food and agricultural system needs to be exampled. We need to reinvigorate the commitment to teaching, research and public service; to organize programs and projects more efficiently; and ultimately to enhance the accountability to the public for these programs.

Let me speak to a few of the 20 recommendations that are appended to Dr. Albert's testimony. The specifics really reside in refinements in Federal policy, in reorienting incentives and signals to the Land Grant colleges.

The first recommendation would be that the receipt of any USDA administered funds at a Land Grant university would be predicated on the fact that the university demonstrated an ability to get input from a wide variety of stakeholders.

The second recommendation is that a significant share, perhaps as much as 25 percent, of USDA administered funds for teaching, research and extension should be provided for incentives for regional centers, consortia, programs, and projects that integrate and mobilize multi-State and multi-institutional resources.

A third recommendation is that Federal formula funds for research and extension be combined into a single allocation and that a renewed emphasis on the integration of the tripartite mission be further enhanced by providing that 50 percent of those funds be for projects that do just that, support programs, projects, and activities that are integrating teaching, research, and extension.

A fourth recommendation goes to the question of competitive research, again, recommending that you fund at the levels previously authorized for the National Research Initiative and undertake the implementation of the merit and peer review system, as was mentioned by other witnesses, in a two-tiered fashion similar to that at the NIH.

Last, in the area of research funding, it is important to point out that the committee did find that a role still exists for formula funding for many of the reasons that Dr. Adkisson pointed out in his testimony. The committee did believe though that it is time to revisit that thorny issue of just how that formula is designed and implemented.

The last recommendation of some relevance, also spoken to by the administration witness, is a change in the way that funding is done for research at the 1890's institutions. As you know, current law requires a match in the Federal formula based contributions to the 1862 institutions, and the committee recommended that a similar change be made for the 1890's institution.

In closing, I would like to make a few remarks on the food genome project that was spoken to by the administration and other witnesses. We were asked by USDA in April to bring together a number of research scientists from the private sector and from academia and the Federal Government to discuss how such a program would be put together, what opportunities there might be, what issues might arise.

We brought together folks from the genome programs for the human, the mouse, Arabidopsis, livestock, maize, and I can point out a few things that seem to be shared by most of the participants.

First of all, they believe that a coordinated effort at mapping and sequencing the genomes of important food, fiber, and microbial organisms was a more cost effective approach to the current piecemeal approach.

And the second point that seemed to resound throughout the room was that good planning done now would pay off in the long term rather than just launching into the project without that intense planning.

And I will end my remarks there.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Gilman appears at the conclusion of the hearing.]

Mr. COMBEST. Thank you very much.

I would like to compliment all of you on your testimony. There are obviously some very specific recommendations here, and it helps us a great deal to have those specifics.

We are all anxious to get to the same place, and that is to get the maximum return for the research dollars invested, to cut duplication to the extent that is possible, and see what is working and not mess it up and see what is not working and hopefully change it to the better, and that is a fairly formidable task I think we recognize.

A number of you discussed the need to increase industry input, stakeholder input, the recipients' input, and I think that is obviously something that is good. There are some sort of hidden concerns in that, I think, that obviously need to be addressed, as well, and that is to try to make certain that in doing that that you have agriculture represented across the board.

What is a priority and how is that determined? And to some people it may be a tremendous people. To others it may not seem as much as a blip on the screen, and that is something I think we have to address because if you are involving the stakeholder, the recipient of a good research program, you also run the risk of having to answer the question of: is there a special interest involved there?

And I think it is something that we need to look at very carefully because if there are groups on the outside that are having difficult times and need research dollars looking into a specific area and have no one to speak for them, I would be the first to scream, if it were me, that I do not have anybody on the board. I do not have anybody looking after my interests, and those people who are there are looking after a special interest.

And I do not know the answer to that, and yet I think it is something that we should look at.

Mr. Knill, you mentioned a number time, calling them stakeholders, and I think obviously that is a self-defining term. We all understand who those are.

One of the things I have been interested in pursuing, and I am certainly not to the point yet of knowing how we do this, but it is to increase the role of the public-private sector and to look for stakeholder investment, and that is not an easy task to accomplish because if you are talking about it in terms of crop specific, if you are doing research on wheat, obviously the wheat producer benefits. Obviously the Nation benefits, too, but then something may be found in that research that is extremely helpful not only to other grain crops, but some other crop that is totally nonconnected.

How much willingness do you—and I could ask this of each of you that would wish to respond—how much more willingness do you think that there is possibly with some restructuring for the private sector to invest in a cooperative effort with public-private dollars in order to try to increase the amount of research that is going on out there?

Mr. Erickson, you had mentioned some things that are going on there and we probably will not get to them in this ground, but I would like to come back to you and find out how that has worked and what suggestions you might have on how we might make that work better.

But how much more willing is the private sector, a farm association, such as American Farm Bureau, albeit soybean or wheat or cotton or whoever, producers, willing to invest in a matching or in some kind of cooperative grant with the Federal dollars to increase the availability of research?

Mr. KNILL. Sir, you did direct that question to me?

Mr. COMBEST. To anyone that is interested.

Mr. KNILL. Yes. I think there is a willingness to increase. I know within my own State of Maryland our Grain Producers Association is in joint venture with the University of Maryland doing things. There are private foundations, and they can range everywhere from environmental to strictly agriculture that has an interest in teaming up with research to determine environmental impacts, a more economic way of producing food or whatever the case might be.

I think there is an increasing willingness to do that.

Mr. ERICKSON. Mr. Chairman, some of the successes that the soybean industry has had in leveraging and partnering have been in specific projects or end result products, for example, a particular characteristic of oil in a particular variety of soybeans or an increase in protein in a particular variety of soybeans. I think that has been very successful.

I think our ability to carry that the next step to what sorts of general research can be leveraged and partnered to make not only positive gains for soybeans, but for other crops, I think, is the piece that is missing so far. We have not done that part very well, but we have done a good job of using private, public, and producer dollars in some of these specific end product results.

Mr. COMBEST. If anyone else wishes to comment; certainly there is no comment required.

Mr. ROSE. Mr. Chairman, I would like to make a comment or two regarding that. I am also the president of the Oklahoma Grain Sorghum Producers Association, and we travel across the State each year holding grower meetings, and this past winter we were able to pass a checkoff program for grain sorghum in Oklahoma.

As we met with the farmers and talked to them about this pending legislation, I expected that we would get some amount of resistance. By and large, the farmers were supportive of this program, although it takes some dollars out of their pocket. They realize that the profitability of agriculture is so marginal that we need every advantage we can get. We need to stay on the forefront of scientific advancement in order to maintain that profitability on our family farms.

Mr. COMBEST. Was that specific to research?

Mr. ROSE. Yes.

Mr. COMBEST. The checkoff?

Mr. ROSE. Research and market development.

Mr. COMBEST. And the association makes the decision about actually how to spend the dollars?

Mr. ROSE. No, there will be a checkoff board established that will do that that will be elected by the producers. We were just facilitating and educating the farmers.

Mr. ANDERSON. For Minnesota Wheat Growers, I would just like to speak to the issue. In Minnesota, we presently have a 1 cent a bushel checkoff that is dedicated to research and promotion really, and presently we are discovering the idea of dedicating an additional cent per bushel to research and particularly maybe half of that cent to a State wheat breeder, which would be a new position in the State and would work directly with our ARS wheat breeder, who is stationed at the University of Minnesota, and I know that Dr. Phillips could speak to that.

Also, we have money invested in an endowed chair in the Entomology Department at the University of Minnesota. So there is all kinds of evidence of past cooperation and collaboration, and I know that we look forward to a healthy relationship in the future, and producers will step to the plate if there is some chance to enhance dollars.

Mr. Combest. My time has expired, but are your checkoffs mandatory? Both of you?

Mr. Anderson. Our checkoff in Minnesota at the present is nonrefundable.

Mr. Combest. Is yours as well in Oklahoma?

Mr. Rose. It is refundable, sir.

Mr. Combest. It is refundable.

Thank you.

Mr. Dooley.

Mr. Dooley. Thank you, Mr. Combest, and I, too, want to join you in your comments on commending the Department for presenting a specific proposal for us to consider.

And I would like to spend some time going through some of the components of it, and I will do it somewhat in order.

Dr. Robinson and Dr. Phillips, you spent some time talking about the genome project, which I think is terrific. I also had a chance when I was reading Dr. Gilman's testimony though; he had expressed some concerns about whether or not we had developed an implementation plan that was commensurate with what we did with the human genome project and in terms of do we really know how to proceed in a manner which is going to maximize our opportunities and the money that we are investing in this.

And I do not know if you had a chance to hear some of the concerns that he expressed, but I would just be interested in how you respond to that.

Mr. Robinson. Let me begin in a general way, Congressman Dooley, and then ask Dr. Phillips if he would respond as well.

We are still trying to refine that approach and the implementation procedure, and so I think that is a valid question on the part of the academy as we begin this process, and trying to lay out a strategy for proceeding with this program that hits two or three things.

One is the state of the science at the moment, the greatest needs, and the greatest cooperation we can get with scientists both in this country and other countries, to be able to develop a strategy that is workable within the potential funding arrangements that we can devote to that kind of program.

Mr. Phillips. Well, it is in the early stages of development. Perhaps the most advanced is the consideration on the plant genome, for which I am chairing an interagency working group, and we have released a status report at the end of June. We will have a full report by the end of the year with a much more detailed plan.

But in there there are a number of scientific steps described relative to understanding the structure of the genome and gene isolation and the application, manipulation; also discussions for international cooperation, discussions with public-private partnerships.

So the plan for the plant genome is being very seriously developed. We had the benefit of the National Academy of Sciences meeting in April and the benefit of several other scientific meetings during the summer to help define the science. So we do have ideas, as well as on the animal side. The Animal Coordinating Committee has submitted ideas on how they would see the animal genome program develop.

So we have a lot on the table right now and it could be as available, but the plan is evolving and not a published document yet.

Mr. DOOLEY. On section 3.1, where you talk about having a minimum of 25 percent of the Federal extension funds being multi-State, regional, or national collaborative activities, I have a question. California, Florida, Texas have a large amount of specialty crops. And California, for instance, produces 50 percent of fruits and vegetables, is there any reason for some of that industry, especially crop industry, to be concerned when you have this 25 percent allocation for multi-State and also regional when 100 percent of some of these crops are grown in State?

How does the Department view or how are they going to handle that?

Mr. ROBINSON. Well, particularly in the set of crops you just mentioned, they would not be scattered as much in a region, a geographic region, as they would multi-State across regions, and that is the reason for the multi-State approach as opposed to just a regional approach.

California might be cooperating, for example, with Texas and Florida in a citrus issue or in a vegetable issue, crops which are common to both sides of the country. There might be particular crops that you would want to devote specific attention to in the State of California, for example, if near 100 percent of the production were located in California.

This does not suggest 100 percent of those extension funds allocated to that, but it really concentrates on a portion of them to allow the leveraging of that portion across States, to be able to develop programs and leverage resources all the way across as opposed to developing a program in California, a program in Texas, and a program in Florida for basically the same kind of work.

Mr. DOOLEY. The other question I have relates to your section 4.3, I think it is, where it is eliminate the matching requirements for equipment grants under NRI to enable capacity building activities.

I guess over the course of these hearings I have yet to be convinced that we have a lack of research capacity in the country, and if we are trying to allocate our Federal funds in order to maximize the return, why are we talking about eliminating a match for Federal investment here?

I am having difficulty understanding the thinking behind this.

Mr. ROBINSON. OK. The purpose of this particular section in terms of eliminating the match on equipment grants would allow small institutions that are trying to build their capacity. Several of the different small institutions, the EPSCoR institutions, the 1890's, have visited us and presented the fact that they have a difficult problem building their own capacity to be competitive in the national research arena, including the National Research Initiative.

In fact, their argúment is if they could get assistance through non-matched equipment grants, then that would help them to become more competitive generally.

Mr. DOOLEY. That appears though that it might be a little bit inconsistent with what you are calling for in terms of a match for the 1890's, eventually a 50 percent match, which there currently is none. That does not appear to be consistent with that line of thinking.

I guess I would just go to Dr. Gilman and the research that you did and the publication. I mean, did you find that there was a need to create additional capacity and the elimination of the Federal match on equipment purchases is something that would be a wise policy?

Mr. GILMAN. I think our committee would answer that probably the first order of business is to realign the resources that we do have to more closely match the problems that the research community is looking at, much like your discussion of going to multi-State and multi-regional questions, to really just reorder the way we apply those resources.

Mr. COMBEST. Mr. LaHood.

Mr. LAHOOD. Thank you, Mr. Chairman.

Mr. Chairman, I have a real parochial issue. I have an agriculture research lab in my district, and I notice that the ARS director is here, but not one of the witnesses, and we have had a little bit of a problem with funding our lab, particularly a pilot project in terms of the construction there, and I just wonder if it is possible for the ARS director or Dr. Robinson to comment on the current funding for that pilot project, that we are trying to get initiated at the Peoria lab.

Mr. ROBINSON. Mr. LaHood, as I stated in my earlier comments, Dr. Knipling is here to respond to questions, and certainly he has more expertise than I. So I would ask him to respond to your question.

Mr. LAHOOD. Thank you.

Mr. KNIPLING. Mr. LaHood, I believe you are speaking of the renovation of part of the facility there.

Mr. LAHOOD. That is correct.

Mr. KNIPLING. Speaking of the pilot plant facility at Peoria, that has been under design for renovation. We have received appropriations in increments, and we have actually designed the construction of it to be in 3 phases.

The bids for the first phase came in a little high, which is something we have had experience with, and we made a reprogramming request to the appropriations committees to allow us to move monies from one project to another. That is going through the approval process right now.

We do not expect any problem with that, and we would expect those resources to be available within the coming month. Certainly you can get that contract awarded before the end of the fiscal year.

Mr. LAHOOD. I appreciate that.

Mr. Chairman, I appreciate the number of hearings that you have held on this and the fact that earlier on we did have the director of our lab here and also one of the associated programs at the agriculture lab, the BRDC, and I think it was very helpful to committee to have an opportunity to hear from them.

I wonder if I could just pick up on something that Mr. Dooley said in terms of the idea of do we have too much research going on in our government. Is there too much agriculture research going on? Is there too much research capability, or are we at about the right capability?

I would be curious to know what any of you think about that. As we are writing the research title of the farm bill, I think some of us, particularly those of us who have research labs in our districts, realize the value of them and also realize or I, for one, think that we probably do not have enough, but I am curious to know what the rest of you think.

Mr. PHILLIPS. I might respond. Inherent in the question, Mr. Chairman, I believe you mentioned capacity as opposed to capability. In the National Research Initiative, we receive about 3,000 per year and turn down about 2,300 of them.

Last year, I began to realize that we were turning down proposals that were ranked extremely high. Out of the 28 programs within which we fund, there were 13 that we did not get out of the high category, and most panel review people will agree, I think, that if you make it into the medium category you really have an excellent proposal.

So my reaction is that there is capacity there that we are not able to provide the resources for to have the opportunities that are laid out in front of us. So we have the idea. We have it written on paper. We have someone willing to do it, but we do not have sufficient funds to fund it.

I think the response to the Fund for Rural America is another example showing that there is capacity there. A tremendous response in terms of proposals.

So resources, I think, truly are limiting to take advantage of what is available to us right now.

Mr. ERICKSON. I think if you review the 64 studies the ARS has evaluated showing a return to taxpayers of over 46 percent, if you were in a private business and you found that return on your investment, you would put more money there.

If you look at the challenges we face in losing cropland every year in the United States and at least we are going to have a growing population and all of that, it is in the long-term interest of every consumer that we invest in these areas.

Environmental issues are increasingly putting burdens on agriculture in terms of getting more efficient and effective. So you look at our competitors and what they are investing, and I think by no measure are we putting too much into this area because it benefits every single consumer in the United States and many around the world.

Mr. WEBER. I think that the Congressman raises a good point, and I tried to point out in my testimony that producers and private industry have, in fact, beefed up, if you will, their investment in research with the understanding that we felt Federal funds were going to follow as well.

So certainly we do not think now is the appropriate time to begin to limit resources there, just as we are making some very positive headway. The Congressman mentioned the lab in Peoria, which I live within about 60 miles of, certainly, one that has provided lots of positive benefit to producers throughout the Midwest, if not even further than that.

So while we may have to look at what we fund and where all we fund it, I do not think that there is any less need; in fact, even a growing need has been mentioned before for continued agriculture research.

Mr. LAHOOD. Mr. Chairman, could I ask one more?

Mr. COMBEST. Yes. I think Dr. Adkisson also was wishing to make a comment.

Mr. LAHOOD. Okay.

Mr. ADKISSON. I want to make a comment to say that my experience at Texas A&M University, I left my faculty position about 15 years ago to go into higher administration, and then I returned to the faculty in the Entomology Department, and what I found in that 15 years was that the people that are doing production oriented research now are underemployed and underfunded. The people that are trying to find better insect control programs, breed better varieties, people that are doing farm research at the centers, at the outlying centers are underfunded, and the people in biotechnology have a lot of money, and the people that are not biotechnologists are trying to chase that money, and they cannot get it because they really are not trained in that area, and they really do not want to do that kind of research.

So you find some very fine production oriented scientists that are not fully employed, and they are not answering the problems that these men from the commodity groups have brought to them, and they know that as well as I do.

The other thing I found is that in the departments of entomology and the crops and soil sciences, and I think animal sciences, at Texas A&M—and we are one of the largest agriculture colleges in the country—half of the Ph.D. students are foreign born. They come from Africa. They come from Asia, and they come from all over the world, more from there than from Texas and from Oklahoma and Louisiana and Arkansas and areas where we used to draw students.

So if you go to a graduation exercise, you see the Ph.D.s being put on foreign born, about half of them, which means at some point down the line those old guys like me who have just retired and Ron, who is going to replace us? And they are not going to be people who come off the farms and ranches like we did and become agricultural scientists. They will not have that kind of background. They will not have that kind of knowledge.

So I can say to you that agricultural research is declining in this country, and the base of the research that we need to sustain our food supply is declining as the world's population is doubling, and I think we take a very short sighted view of where we are going.

You can downsize a car to make it more fuel efficient. You maybe can downsize an airplane and make it more fuel efficient, but all of us require about 1,500, 2,000 calories a day to be efficient. You get below that and you are not very efficient, and there is not any way to downsize that that I know of.

We need to maintain a base for sustaining our food supply in this world.

Mr. LAHOOD. Mr. Chairman, may I ask the ARS Director another question?

Mr. COMBEST. Sure.

Mr. LAHOOD. Dr. Knipling, as you know, in the House version we put about $8 million in for this pilot program or pilot building, and the Senate had, well, close to $4 million. Are you saying that you think the full $8 million will be or are you supporting that?

I know I have been working on trying to get, you know, hopefully the entire $8 million in there because I think that is what the Peoria lab needs. Are you saying that you support that effort also?

Mr. KNIPLING. Yes, we do. That was part of the administration's request for the full $8 million. That particular project is actually different, a different portion of the facility than the pilot plant portion that we spoke of earlier.

This is the so-called north wing of the facility. And that requires an $8 million renovation. The House did provide that full amount on the Appropriation Committee. The Senate did not. Certainly that will be on the conference table.

But we are supportive, yes, of the full $8 million.

Mr. LAHOOD. Thank you, sir.

Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman, and may I repeat what you have already said as to the tremendous value and quality of the testimony we have had as it relates to rewriting of the research provisions of the farm bill, and I am very grateful to all of the witnesses for what they have done.

I just have a few comments. First, with regard to Mr. LaHood's last point about the need for more research, that is a perennial problem in every field of research, and I have come to the conclusion that as long as human hopes and aspirations are unlimited, that we will only be able to fulfill them by the contribution that research makes to meeting those hopes and aspirations, and it applies in every field, not just research.

Currently I think it would be generally agreed, and I think the witnesses agree, that we are underfunding agriculture research, and we are underfunding other kinds of research, but the amount that we should be spending is going to be difficult to determine. We need to think about it carefully.

I wanted to express my appreciation to Dr. Adkisson for his comments, and particularly on the area of the contributions that molecular biology might make in some very important areas. I would like to say that my mentor for many years here in the Congress was the Congressman from College Station, Tiger Teague, whom I am sure you knew very well. He chaired both the Veterans' Committee and the Science Committee, which I served on, and I became subcommittee chairman there, and I owe everything I know about Congress to his help and understanding.

Now, I have a question that I would like to relate to Mr. Erickson and perhaps to Dr. Adkisson as well. It has to do with the possibility that in the case of soybeans there might be a human health effect stemming from a large concentration of a trace metal in soybeans, manganese specifically, which soy has a large concentration of manganese, and soy formula concentrates that and to the point where children who are fed on soy formula may get a large amount of manganese in their brain system.

Now, I brought this up with Health and Human Services with NIH, and they say a lot of research is being done, but nothing specifically on this issue of the concentration of manganese in soybeans. May I ask you specifically if you know of any research being done in this area?

Mr. ERICKSON. No, I do not know of any research, at least farmer funded research, that is being done in that area, no.

Mr. BROWN. Yes. Well, I am a little puzzled by that because if there is an element of an adverse impact upon infants, we are going to face the possibility of something like the alar problem in apples if it turns out to be the case and we have not anticipated it and done some research.

Now, this fits in, Dr. Adkisson, with your position that there could be a lot more research done in the positively beneficial effects of certain components in food that has an inhibiting effect on cancer, for example, and if this kind of research is being underfunded, probably there needs to be some way of calling the attention of the research community to the importance of doing something in this area.

Can you suggest how we could go about that? Do we put more money into it specifically?

Mr. ADKISSON. Let me answer that I do not know about the specific problem you are talking about. I do know that Bruce Ames at University of California, and you may know Bruce, has identified a lot of natural carcinogens in plants as well as official compounds.

So we have some compounds in our food plants that we need to get rid of, and this may be a problem.

I do know that on soybeans there are a number of compounds in soybeans that are very healthy, benefit your health and aid in the prevention of diseases. Work has been done at the University of Illinois at Champaign-Urbana on this, and also at the University of Alabama Medical Center in Birmingham.

But if we could identify in a crop like soybeans, which in this country is animal feed except for the oil, compounds to make soybeans more of a human food than an animal food, think what the value added would be, in addition to maybe adding some years to our lives.

But we are finding in food plants, and I do not think there ought to be any big surprise that we find food plants' compounds have therapeutic value. There are hundreds of them, and in places like Johns Hopkins, M.D. Anderson Cancer Center in Houston, University of Texas Southwestern Medical Center in Dallas, University of California Medical School in San Francisco, people are identifying these compounds, but it is surprising to me that in the agriculture research, we do not have anybody yet saying, "Look. We can enhance those compounds."

I know in our own case that we have been involved in just looking at like beta carotene in carrots and find out there is huge variability. So these could select farm by conventional breeding, but we do not know what the maximum effective concentrations are. We do not really even know yet what all of the compounds involved are.

So it is very complex. It is a very complex problem, but it is very exciting because we are what we eat, and what I am afraid of, Congressman Brown—and you are one of my favorite Congressmen from many years ago. I was on Winrock with you one time on top of a mountain. Do you remember that?

Mr. **BROWN**. Right.

Mr. **ADKISSON**. They are going to find out about this about 25 years from now, and it will be too late for you and me. [Laughter.]

Mr. **ADKISSON**. We need to find out now so that we can prolong our lives a little bit longer.

Mr. **BROWN**. Well, I would just like to make a final comment that when we considered the original report from the Board on Food and Agriculture for the National Research Initiative, it was because we felt we were underfunding this kind of complex, interdisciplinary, cellular research, and we are still, in my opinion, underfunding it, and we need to do something about it.

Several of you have commented on that, and I appreciate these comments very much, and my remarks were not meant to indicate there is anything wrong with soybeans. It is just that certain trace elements in certain people can have adverse impact, and we ought to know about that, and we are not doing the research to do it.

I was amazed that NIH was not doing research in this area, and there is a long statement in the appropriations bill which I carefully crafted indicating the need for additional research by NIH in this area, but since it involves food, it should also be a part of the food research program.

Mr. **ROBINSON**. Mr. Brown, perhaps I could add just a comment to that. We did support through a Federal partner in the research community and in cooperation with the Institute of Food Technology, a scientific conference in Chicago a few years ago dealing with naturally occurring toxicants in foods, and that has been one of the bases that has guided our research agenda.

So it is an excellent point that you make.

Mr. **BROWN**. Thank you very much.

Mr. **COMBEST**. Mr. Smith.

Mr. **SMITH**. Thank you, Mr. Chairman.

In the late seventies and early eighties, I was a member of and the public representative on the Joint Council Advisory Group on Food and Agricultural Science, and I was concerned then and I am still concerned that we are not making the necessary effort in tracking the agricultural research that is being conducted in other countries, and some of that research is harder to obtain.

So maybe, Dr. Robinson, can you tell me what kind of staffing, how many people, and how we go about tracking that research?

Mr. **ROBINSON**. I am not sure that I could answer your question quite as directly as you asked it. We do not have any one designated, for example, to track particular science in different areas in other countries, yet we do have people who are working in the scientific community, for example, research in genetics, and I will ask Dr. Phillips to respond to this, too, because the food genome work that we are proposing in this initiative is an example of that, where we can actually benefit from the research that is going on in other countries, as opposed to just being the provider of research results in the international community.

That is particularly true, for example, in rice genomic work. Japan has done a good deal more than most other countries, and where we could benefit in a collaborative arrangement.

Mr. SMITH. It would be my concern that if there is not some structure to our investigation and tracking of who is doing what research and finding out the results of that research in other countries of the world, then we are probably in some cases missing the boat if there is not some structure to that examination.

Mr. ROBINSON. The structure comes mostly from the scientists who are in the business of trying to discover where different kinds of research are underway. The beginning of almost any project involves a literature review and attending conferences where you become acquainted with what other scientists are doing.

It occurs more in terms of preparing to initiate a piece of research than in terms of attempts to monitor the research that is underway.

An additional mechanism for that is through scientific societies, both national and international scientific societies.

Mr. SMITH. Yes, I know, and those have existed for the last 30 or 40 years, but still, some countries do not have the publishing requirements, for example, for their public research that we do in this country, and so my impression is and my meager investigation is that if it is not pursued and not structured, too often some things pass by us.

And if there is a particular concentration in the genome research, then I am sure the investigators are going out looking at it.

Does anybody else have a comment?

Mr. ADKISSON. I just wanted to add to what Dr. Robinson said that science is a very competitive sport, and the best scientists in this country know what is going on in their competitors' laboratories, and you do that by being involved in international conferences and symposiums, scientific meetings, by word of mouth, by being involved in the food and agricultural organization of the United Nations.

So there are a lot of ways that our scientists are the leaders in the world, and they know what is going on. You know what is going on in your competitor's lab, I can tell you.

Mr. PHILLIPS. I might just add that, of course, some of the resources you do provide goes to support this kind of activity, not a tracking activity, but funding of conferences. The National Research Initiative last year funded 31 conferences each in a small amount, an average of $6,600, and many of those are international in nature. They and are more costly than what any one group can provid, but funding international conferences is one way to increase tracking of international work.

In addition, the Internet is enhancing international communication phenomenally at the present time.

Relative to the food genome issue, we have had a preliminary meeting of key scientists from Japan and Europe and the United States, talking about international cooperation. So on a specific basis and a need basis, it is happening, but nothing formal yet.

Mr. SMITH. After the United States, who would be the next three or four most aggressive countries in terms of their investment in agricultural research?

Mr. ROBINSON. More than likely many of——

Mr. SMITH. Do we know?

Mr. ROBINSON [continuing.] Many of the countries of the European Community would——

Mr. SMITH. Do we know? Is this an absolute? Do we know how much these countries spend? And could you provide me that?

Mr. ROBINSON. I do not have current data, but I can see what I can find and provide you that.

Mr. SMITH. Well, in finishing up, as a farmer I have always been concerned that farmers sometimes are just a short-term benefactor of a lot of our research, and so to the extent we can, I would like to be more selfish in making sure that our research is geared to our particular climate, our particular soils, our particular infrastructure.

And I would hope we could work in, Mr. Chairman, the kind of language to hopefully build in that kind of criteria.

Just a final comment maybe from anybody that would like to comment on both research and education moving away from production agriculture to other areas, and as money becomes short, a greater willingness possibly to take the co-pay or co-contributions of industry that sometimes is going to be the kind of research that is going to benefit that particular industry more than production agriculture.

Any comments to sort of wind this up on how we make sure that our farmers benefit to the greatest degree? Yes, Mr. Knill.

Mr. KNILL. I think it is important that we stay focused on what the agricultural research should address. Not only do we benefit each and every person here in the United States when they sit down to a meal directly through agricultural research, but we indirectly affect every person in the United States with the balance of payments that agricultural products provide this country, which allows a higher standard of living.

So agricultural research is very important.

Mr. SMITH. Thank you, Mr. Chairman.

Mr. COMBEST. Ms. Stabenow.

Ms. STABENOW. Thank you, Mr. Chairman.

I appreciate everyone's information and testimony today. It has been very enlightening. I specifically want to address a question to Mr. Anderson.

I appreciate the work that you have been doing on the wheat scab issue and understand the seriousness of what is happening as it relates to wheat and barley.

I also would take a point of personal privilege to introduce a constituent of mine who I know is here with you from Michigan State University, Rick Ward, who is an assistant professor and plant breeder, and I want to thank Rick and the folks at Michigan State for helping to lead this.

I have to put in a plug for my alma mater, Mr. Chairman, whenever I get an opportunity to do that.

We have heard you mention, Mr. Anderson, today about the significant losses to date for wheat scab, and yet we know that if left unchecked, we will see additional losses that I would like to have you talk about. I understand that the zero tolerance policy that many processors have adopted toward vomitoxin has already led to shifts in markets and higher costs to consumers, and I wondered if you could elaborate more on the cost implications, the trade implications associated with the spread of the disease that you talked about this morning.

Mr. ANDERSON. Well, I am going to let Mr. Rick Ward address those questions.

Rick.

Mr. WARD. Good morning.

Your question is regarding the trade aspects of vomitoxin?

Ms. STABENOW. Trade and also consumer aspects just in terms of costs of not addressing this particular issue.

Mr. WARD. Right. What the National Association of Wheat Growers report just concluded and what we have felt intuitively is that the low tolerance or zero tolerance policies will result in a major realignment of where wheat is grown, and for instance, the cereal industry in Michigan the last year to a great extent refused to accept delivery of Eastern United States wheat. They went to Idaho for their wheat.

That added $2 per bushel at least in transport costs. That cost is ultimately passed on to the consumer.

The international community is beginning to focus more and more on vomitoxin as it has on other toxins, and this can represent trade barriers for us and, therefore, declining value of our crop.

I think I will stop there.

Ms. STABENOW. If I might ask you one more question, Mr. Ward.

Mr. WARD. Yes, ma'am.

Ms. STABENOW. I understand that the 12-State cooperative project would be multi-sectored and multi-disciplined. It really speaks to what I have been hearing on the subcommittee as testimony in terms of the direction that is being recommended in terms of public-private sector working together, working with the universities.

But would you describe a little bit more about how that would work as it relates to the wheat scab and vomitoxin issue and why you think that this kind of approach would be effective?

Mr. WARD. The problem of scab is proving to be quite intractable. We would like to have a gene cloned that would stop it cold in its tracks, but at this moment in time we are not sure where the inoculum comes from that infected Tom's field this year unfortunately.

There are very fundamental, simple questions of plant pathology-epidemiology that we do not have answered and that are difficult for an individual scientist to answer. We think we need to pool our resources.

Since this is regional in scope, one needs to have experimentation on a regional basis. For instance, this year the eastern soft wheat areas have to a large extent escaped. The only area that I am aware of that got hit hard was central Kentucky, but Minnesota has been hit again by scab.

First off, we do not know why. The predictions in Indiana and Illinois were that we were going to be clobbered because it was raining during flowering. Well, our dogma was wrong because they did not get clobbered.

How we can address this issue scientifically when we do not understand simple things like when is it going to happen is beyond me, and it is going to take all of our minds to do that.

Multi-discipline because we want to try to keep the vomitoxin from entering the crop, and that involves pathologists, production specialists, and so on, breeders. We want to try to remove the vomitoxin if it does get into the crop. That is a grain handling, grain science, food science arena. It is multi-sectored because it goes from the farmer to the elevator operator, to the miller, to the food processor, and it is amazing how ignorant we are of each other's knowledge base and activities.

Mr. Smith asked about international knowledge, knowing what is going on in another country. I will tell you here that in this process of these 12 States coming together, I will guarantee you every single one of the 40 or more scientists involved has learned about something going on in the neighboring State that they did not know about.

And so we are all islands of knowledge, and we need to actively bridge those, and that extends as well into industry. Every time a miller speaks, I learn something I did not know, and yet I am providing him or her his raw product. Do I know how important something is? Not necessarily, not if I have not sat down and spoken to them.

So we need client orientation. We need an entire multi-sector, multi-disciplined approach, and this is not a brilliant idea. Scab is going to destroy the wheat industry in the eastern United States. It is a mortal threat. That is all there is to it, and we need to marshal all of the resources we can.

We know money is short, but this is a problem that we can document. The billion dollars mentioned was three States. It was three States, but we have been hit elsewhere. So the losses are huge, and it is just real obvious we need to work together to do this, and we need to work with ARS, as well.

Ms. STABENOW. Thank you.

Mr. COMBEST. Mr. Lucas.

Mr. LUCAS. Thank you, Mr. Chairman.

As always, it is a pleasure to be here, and if I could direct my one question to my constituent sitting out there in the panel from the panhandle, Mr. Rose.

In reading your testimony, Kenneth, you state that the Secretary has existing authority to shift funds from one agency to another in health emergencies, and that he may well need additional authority to allow focus on specific emergencies which might be deemed to severely impact production of markets.

Is it your contention that he does not have that authority and should he have that authority?

Mr. ROSE. I think what we are saying there is he should have that authority, and to specifically relate to a problem in the sorghum industry that is just coming to our attention this year is the problem of the sorghum ergot that is moving up from South America into south Texas and into the seed production area of the grain sorghum crop.

That is just one of many instances of emergencies that we see from time to time. You have heard the testimony this morning relating to the wheat scab. We need the ability or I think what we are saying is if the Secretary had the discretion to respond to those with significant dollars for major projects, that would be a way of protecting our food industry and our food resources.

Mr. LUCAS. So preventative medicine is still the best medicine, so to speak.

Mr. ROSE. Oh, yes.

Mr. LUCAS. Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Peterson.

Mr. PETERSON. Thank you, Mr. Chairman.

I would like to welcome Mr. Anderson, one of my constituents. We appreciate your leadership, your organization, and for those that are not aware, I think Minnesota has put what, $3 million into wheat scab research in the last 3 years alone? So we recognize in Minnesota what a problem this is, and it is, I think, showing up again right now in the crop out there.

I guess in light of the fact that I think your organization and the other groups had asked for $5 million in the appropriations bill and we only got $500,000 so far, I guess, is there some other way that this can be accomplished? Does ARS have the authority to shift resources or what is the strategy?

I am concerned. I think Minnesota has made the commitment. The Federal Government ought to be at least matching what we are doing at the State level.

What is going on behind the scenes? Is there anything going on here that will get us to where we need to be?

Mr. ANDERSON. I do not really know, Collin. I think that is what we are about here today and maybe yesterday. We are hoping that maybe the legislation that Ms. Stabenow is introducing along with Blunt might, as I said, gain congressional support. Certainly I cannot speak for ARS, but Mr. Ward and I will be talking to one of their program leaders this afternoon, and we are really trying to discover every method we can, and I am not a politician. So you might know better how to approach that.

We are certainly open to whatever suggestions, but you are right. In Minnesota, we have stepped to the plate as producers and the taxpayer with our recent initiative.

And just as an aside, I do want to say that I do farm in North Dakota, and this disease does not stop at the Red River. It is going to affect Mr. Pomeroy's constituents as well, and it is a big problem, and we really need to get our hands around this thing.

Thank you.

Mr. PETERSON. Well, thank you.

And I am a co-sponsor.

Mr. ANDERSON. Yes, you are.

Mr. PETERSON. And, that will help, I think, if we get the authorization.

One of the concerns I have is that time is wasting here, and we need the money in there now so that we can move on this research.

Mr. ANDERSON. Certainly, Collin, we really do need that, and like I said, we are open to any and all suggestions, and as you know we have worked very closely with you, and if you have any thoughts, please get them to us. You always do.

Mr. PETERSON. Yes. One other question, and it might be the gentleman who was behind you there that might know about this or maybe you would know.

One of our old neighbors, Jim Cook, is a researcher out in Washington State who did research on fusarium in the root of wheat and apparently bred it out after 20 or 30 years, as I understand it. Are people aware of that research, No. 1?

And, No. 2, is any of that useful in what we are doing here? Will it give us any kind of a leg up in getting a handle on this?

Mr. ANDERSON. I will let Rick Ward respond to that.

Mr. WARD. The dogma to date is that the seedling resistance that Dr. Cook has worked on with colleagues is not applicable to the infection of the head, which is the grain developing part that we are concerned with now.

However, my guess is—and I would have to say I am guessing. I do not know that literature myself—but my guess is that the actual mechanism by which that works is as of yet unknown, but it is empirical that we found plants that did not show fusarium seedling blight and amplified their presence in breeding materials.

But why? What is the chemical basis of that? I seriously doubt that that is known. That might lead to a solution in other situations like the head infection. So I think that work should be built upon, but at this point it's not directly. You just cannot take those genes and move them and make that work for head scab.

Mr. PETERSON. This work that is being asked for in this genome, is any of that going to be helpful? Would that type of research be helpful in trying to get at how to solve this problem?

Mr. PHILLIPS. Yes, it would definitely be helpful. The University of Minnesota just last week was able to successfully recruit a new assistant professor working in the molecular biology of wheat and barley with scab being one of the primary emphases.

Part of Dr. Cook's work in Washington State that you referred to has to do with the tacol disease, and part of that is to find certain fields do not show the disease, and when they went in there and looked at those fields, they found that in the soil, which they call now suppressive soils, it had certain bacteria in it that suppressed the disease organism, and these bacteria produce a class of antibiotics actually to do it, and that work is through ARS, but also funded through the NRI very substantially.

So this aspect of looking for fields that may not show scab is another possibility that could relate to his work, although I am not aware of that at this time, but the whole idea of trying to use the genomic approach to understand pathological organisms is paramount to the genome program, as well as other programs within the USDA.

Mr. PETERSON. Thank you very much, Dr. Phillips.

I would encourage members of the subcommittee to help us try to figure out a way to get some more money in this program because I think it is a serious problem for not only our area, but the country as a whole.

Mr. COMBEST. Mrs. Clayton.

Mrs. CLAYTON. Thank you, Mr. Chairman.

I do not have any specific question to the panelists, though I appreciate their testimony and have had a chance to scan them individually, but I do have some inquiries in general, and one is just to recognize the inevitability, as we approach the research component of the 1996 farm bill, that we are in the crunch of limited resources, and trying to find how we maximize and continue the research that is so critical for affordable and safe food now only for our Nation, as you said, but also for the world, as well as what it means to have enhanced value added to the process.

I guess this would be Dr. Robinson. Could you just comment on if there is an opportunity for collaboration between other research entities that the Government does with agriculture? And what is the role of the private sector, NIH, and research as it relates to researchers' pharmaceuticals? And how do we in agriculture require our private sectors to play a role comparable to in some instances what the pharmaceutical companies are required or any other areas?

I am trying to quilt the potential of a future support system for agricultural research, and we are going to have to find a model, and if there is a model you can refer us to, because adrenaline resources stares you in the face. You were here last week with extension and 4-H, and now you are here with the individual commodities. So you cannot escape what is going to be the reality of that.

So there must be something looming out there that you are going to access to look to as a guide to make these things possible.

Mr. ROBINSON. That is an excellent question, Congresswoman Clayton, much better than I can give an answer to, but let me make a few points relative to it.

Partnership was one of the issues that was discussed significantly during the process of these hearings from the very first hearing through today. I think gets at the core of your question is how to develop those partnerships appropriately between the private and public sectors and between different areas within the public sector. How do we begin to get better and overlapping agreements between NIH, NSF, our National Research Initiative.

The food genome project initiative is one way we are doing that where USDA would take the lead and we would work with the Department of Energy and with other scientific granting organizations to try to further that work?

An additional way is through the Cooperative Agricultural Research and Development Agreements, which are increasing every year in number as private partners come and cooperate with ARS. Agreements bring money, facilities or some other kinds of cooperative arrangements that helps address some of the more important problems that farmers, ranchers, and rural people are facing.

I think each one of the people that were at the witness table today in one way or another gave an example of some kind of partnership that they were dealing with, between the university and ARS or between one of the commodity associations or producer associations and their respective universities.

It is, as you put it, a most complex quilt that is being woven for the future, but it is one that has as its core the issue of partnerships and how to make them work.

Mrs. CLAYTON. Thank you.

Thank you, Mr. Chairman.

Mr. COMBEST. Mr. Dooley, do you have other questions?

Mr. DOOLEY. Yes, sir.

Going back, Dr. Robinson, to your proposal, I also just wanted to have a little further insight into the section 5.2 where we would be lifting the current cap for indirect costs of 14 percent at 25 percent. Would this be similar to what we see with a lot of the NIH grants, or what is comparable indirect cost reimbursement in other areas outside of USDA?

Mr. ROBINSON. Most universities have a negotiated rate, and the average, I think, now runs about 45 to 48 percent, somewhere in that range.

Mr. DOOLEY. I mean like if somebody was going to apply for a grant.

Mr. ROBINSON. Right.

Mr. DOOLEY. It would be as high as 48 percent on indirect?

Mr. ROBINSON. It would be as high as 48 percent. The proposal that we have, particularly given the mix of funding mechanisms, is to increase indirect cost recovery to 25 percent on our competitive awards above a restriction on indirect cost recovery for competitive grants capped at 14 percent.

But this proposal is to bring that more in line and to bring some consistency among granting mechanisms. For example, the Fund for Rural America is not subject to this cap, but, in fact, can be a negotiated rate; whereas, the NRI is subject to the 14 percent cap.

And what we were beginning to notice and hear people talk about is shifting among funding mechanisms simply on the basis of indirect cost recovery rather than on the basis of the purpose and goals of the funding program itself.

Mr. DOOLEY. And, Dr. Gilman, this would be something in the investigation or research that you did that you would think would be most appropriate, the indirect cap being increased?

Fourteen does seem to be very low.

Mr. GILMAN. Yes, and the inconsistency among the different grant programs is a serious problem with people shopping based on their indirect cost needs as opposed to the appropriate program.

Mr. DOOLEY. The other thing, Dr. Weber's testimony had a recommendation to USDA, and they refer to it as reestablish the partnership, and that basically would be to publish all requests for proposals for competitive and special grants in the Federal Register, and also in the Federal Register purposes of notice and comment, the evaluation criteria for the Government performance and review compliance, as well as a plan of work required, criteria required before formula funds are distributed to respective States.

And thirdly, it said to evaluate the potential role of the two-tiered project review process.

I guess, Dr. Robinson, when I read this it makes a lot of sense to me. Is USDA supportive or interested in incorporating something like this or do you already have something like this in place?

Mr. ROBINSON. Well, we are increasingly trying to make the request for proposals more transparent. There is always a problem in getting those out too rapidly, and you could potentially give some people an advantage, but at the same time, you cannot use that as an excuse not to insure that your request for proposal is addressing relevant issues.

One of the places where we have explored that possibility at the moment, is with the National Advisory Board and the Fund for Rural America because statutorily it is required. So we are developing a process there to explore the priority issues which would be involved in the development of a request for proposals, then ultimately come back in terms of a relevance review.

And I think those were two of the issues that were contained in Dr. Weber's testimony.

Mr. DOOLEY. With what Dr. Weber was advocating, would that process—I know what you are saying being a little bit premature—but would it be too cumbersome? Just in terms of physically, implementation.

Mr. ROBINSON. It certainly would not be without some additional investments of time and energy. How cumbersome? It is difficult to predict at this time.

If we did it from the point of view of publishing a preliminary request for proposal in the Federal Register for comment and then took those comments in the future development, that is a process not dissimilar from what we are trying to use with the National Advisory Board and the Fund for Rural America.

It is still a process to try to get stakeholder input in building the most relevant request for proposals that we can.

Mr. DOOLEY. Dr. Weber, I do not know if you wanted to comment at all on this. It was your testimony I was referring to.

Mr. WEBER. Well, I know in the Department there is seemingly some concern that they may need to do this before there might even be appropriations for a project, and there had been some concern about that. We feel that as long as that is made known that there might actually not be funds forthcoming or there may be changes, it still provides us an opportunity for input and gives early warning of the directions and gives us a chance to correct the course early on, and we certainly recommend they consider this seriously.

Mr. DOOLEY. And, Dr. Gilman, I guess if you would have any comment one way or the other in terms of this, using the Federal record as a process of dissemination.

Mr. GILMAN. Our study group did not get into the specifics, but certainly endorse that sort of two-tiered system where you get input not just on the science, but from stakeholders as to the importance of the research from their perspective.

Mr. COMBEST. I believe Mrs. Clayton had a followup question.

Mrs. CLAYTON. Thank you, Mr. Chairman, for allowing me to do this.

Referring back to the proposal, I guess, it comes as a proposal from the administration in the research. There is a reference to the 1890 colleges now being phased in in terms of there being a requirement of matching share in terms of research. What is motivating this change?

And second, if there is a motivation, has there been some implication as to what would be the impact of the opportunity for research on this institution if, indeed, this is accomplished?

Mr. ROBINSON. The motivation for the proposal is actually twofold. One, this proposal had its basis in the National Research

Council's report of about a year ago in terms of looking at the equity of matching funds for 1890 institutions.

It also is part of the Department's effort for equity and access to funds for research, education and extension programs at 1890 institutions.

There is in this approach, however, an effort to phase in a matching requirement up to a match of 50 percent of the Federal share, realizing that there is a need to move in something like this in a more iterative fashion than to ask for full match at the outset.

Additionally, the proposal as written by the Department has a bit of a fail safe in it in that if a match were not met, that the funds would revert back to the Secretary of Agriculture to address problems important to 1890 institutions, as opposed to those funds reverting back to the Treasury.

Mrs. CLAYTON. How does that work if it reverts back? I see it written, but how does that benefit the institution?

Mr. ROBINSON. There is generally a requirement that if an institution or agency does not meet the requirements for Federal funding, that those funds would revert back to the Treasury.

Mrs. CLAYTON. So it would be lost to agriculture?

Mr. ROBINSON. Right.

Mrs. CLAYTON. So then it benefits the Department. It may not benefit the institution.

Mr. ROBINSON. Yes. Well, this proposal actually has them revert back to the Secretary of Agriculture for use with the 1890 institutions.

Mrs. CLAYTON. As research or as something else?

Mr. ROBINSON. We do not get into the detail here, but it would be in the program for research and education and extension at the 1890's.

Mrs. CLAYTON. Could you just provide the committee information just by the extent of research that is being conducted at the 1890 institutions and their opportunity of participation in the research grants across the board for the last 5 years for us?

Mr. ROBINSON. I am sorry. I am not hearing you.

Mrs. CLAYTON. I said could you present for the benefit of the committee the extent to which the 1890 universities have participated in research across the board maybe for the last 4 to 5 years.

Mr. ROBINSON. We can certainly get that data for you, yes.

Mrs. CLAYTON. All right. Thank you.

Mr. COMBEST. Do any other members have questions of this panel?

Mr. DOOLEY. Yes, Mr. Chairman.

Mr. COMBEST. All right. The gentleman from California.

Mr. DOOLEY. I guess no hearing would be complete without once again addressing formula funding. [Laughter.]

I have been presented with some information, again, that gets into the Smith-Lever allocations and primarily the 3(b) and 3(c). It is kind of interesting when you look at the range in terms of the State and local match and the private match of the Federal dollars.

I think my interest in this and other members' on the committee is if we are trying to get the greatest return on the investment of Federal dollars, how do we leverage more participation from the State and local.

And just to give you an idea on the range we have Rhode Island which their Federal funding constitutes 67 percent of their agriculture research dollars, and we have the low, which is really Florida, which the Federal component is only 15 percent of their agriculture research, and the national average is about, oh, 27 to 28 percent.

So what I am interested in is I am a little concerned when we see the plant genome project and some of these others, which I think all of the industry groups support. How do we get the dollars to fund these?

When we hear the recommendations coming out of Dr. Gilman and the folks that took a look at the agriculture research, they are talking about getting the more competitive grants, and my concern is how do you find the dollars.

And I guess my question would be to some of you: would it not be a good policy to state that we ought to change some of these formulas which were developed back 40 years ago, a lot of them and maybe require more of a State and local match?

If the average right now is at 30 percent of Federal dollars currently in place, why shouldn't we over a period of years be asking some of those States—and Rhode Island is at 67 percent, Connecticut is at 53 percent, and Massachusetts is at 51 percent, Pennsylvania is at 39 percent. Some of these States are not poor States. I mean they have quite a few resources.

Why shouldn't we be requiring them to come down to at least what the national average is of a 30 percent? And if we did this, my calculations on that, we would generate $17.5 million of additional agriculture research if we got that same level of State match, or that money could be available for competitive grants or plant genome, and I would just be interested if anyone would want to comment on the formula process there.

Dr. Robinson.

Mr. ROBINSON. We seem to continue this debate. Just one comment.

I think the numbers that you are using include perhaps both formula and other Federal sources for research or research and education because except for some of the island countries and territories, all States must fully meet the match to receive formula funds.

So some of those are already involved in competitive grants, and unfortunately since we had a meeting, I did not bring my stack of materials with me, so that I do not have them in front of me.

Mr. DOOLEY. I guess it just begs the question though, and, Dr. Gilman, in your recommendations, you made recommendations on some of the formula funds, which were based basically on farm population, which is based on the census, which they include anyone that has $1,000 in gross farm receipts as being a farmer. They also include a definition on rural population, which is a function of this.

The comment that Mr. Rose led off to is a reauthorization basically in a static environment and these formulas constitute not only a static environment, but an environment and formula that was developed 50 years ago. Is that, again, maximizing the opportunities?

You had some recommendations on how some of those should be changed.

Mr. GILMAN. There is no question there have been a number of different suggestions as to the kind of factors that might be considered in a more modernized formula, but recognizing the difficulty of just making decisions.

We have encouraged people in the past to think about simply opening a dialogue, trying to create some kind of more formalized process where we can begin to try and create some consensus in the community as to what better measures might be.

Mr. DOOLEY. And, Mr. Knill, I think you in your statement, if I remember correct, supported encouraging greater local, private, State match. Does the Farm Bureau or what would be your personal opinion if we said that we're looking at this formula. We are wanting to leverage more State and private investment. Why shouldn't we have another component of these formula funds that says that you have to do a better job, States, local, commodity groups, in order to access these Federal dollars?

Mr. KNILL. I think you always have to review those types of funding mechanisms and make adjustments over time. Something that might take into account the farm gate value of products as a different equation in formulating some of those funding mechanisms.

Mr. DOOLEY. Well, yes, being from the State of California, which has $24 billion in agriculture production, we would think that would be a pretty nifty idea actually. [Laughter.]

Mr. KNILL. I did not say exclusively. [Laughter.]

Mr. DOOLEY. I guess just one other issue is that I think throughout the hearings and testimony there has been, I think, some concern that we have got to maintain the flexibility of the Department and the industry to meet some of the emerging priorities.

And, Mr. Erickson, you outlined and several of the panelists outlined a need to strengthen the advisory board or the participation of producers so that hopefully the advisory board can do a better job in making recommendations to meet the priorities of the industry, something I support.

But I also recognize in several of the commodity groups' presentations that where you went down with some of the what I would say fairly generic priorities. You also focus on the precision agriculture, and I am not opposed to precision agriculture.

But I am concerned that if we do empower this advisory board to have the ability and the authority to meet some of the priorities, why should Congress be stepping in and saying that this one area of precision agriculture should have a higher priority than biotechnology or genetic research, which has the potential to also have tremendous benefits to the agriculture sector?

Why should we have that as a part of our policy?

Mr. ERICKSON. I think that what I was trying to indicate is that that is an area that there has been a lot of discussion on, and while it may be a priority for some, it may not be for others, and that we will not get the question completely addressed unless we have the proper input on an advisory committee that is going to allow us to address the issue.

And you may very well be right, that it may not be an issue addressed on a widespread national basis. Then, again, you may find out that there is overwhelming support there because the kind of support that it is getting presently in segmentized research is just that, very segmentized and not very coordinated.

So my point was to raise it as one of those issues that is out there, not to say that it ought to be the priority.

Mr. DOOLEY. And then if we were to define some priorities, it would not necessarily need to be a part of it if we made some of the changes to the advisory board.

Mr. ERICKSON. Yes. I think the whole point is that we need to have appropriate input at the advisory level to make producers, as well as the agriculture industries, feel that they have a direct input to the process and they feel that the priorities are broadly meeting the needs of the industry.

Mr. DOOLEY. All right. Thank you.

Mr. COMBEST. Thank you very much for coming today, and there may be some followup questions, and we would appreciate any consideration that you would give to those, and as I had mentioned earlier, additional information that you may wish to submit would be readily received, and we appreciate very much your attendance.

The hearing is adjourned.

[Whereupon, at 12:18 p.m., the subcommittee was adjourned, subject to the call of the chair.]

[Material submitted for inclusion in the record follows:]

STATEMENT OF RONALD L. PHILLIPS, REGENTS PROFESSOR OF AGRONOMY AND PLANT GENETICS, UNIVERSITY OF MINNESOTA

Mr. Chairman, thank you for inviting me today to discuss the Administration's proposal for a National Food Genome Strategy.

I am Dr. Ronald L. Phillips, regents' professor of agronomy and plant genetics at the University of Minnesota and chief scientist of the Department of Agriculture's National Research Initiative Competitive Grants Program. Recently, I was appointed the Chair of the Interagency Working Group on Plant Genomes by Dr. John Gibbons, Science Advisor to the President and Director of the White House Office of Science and Technology Policy.

As you know, Mr. Chairman, genetics is the study of an organism's characteristics and the transfer of the variations in those characteristics through heredity. A genome is a set of chromosomes, located in plant or animal cells, which contains the DNA material responsible for determination of heredity characteristics.

The administration's proposal for a National Food Genome Strategy authorizes a competitive, merit-based program for plant and animal genome research (and the associated microbes) supported by $200 million over a 4-year period.

Mr. Chairman, genetics research over the past 100 years has led to significant improvements in plants and animals, which has been translated into benefits not only for producers but also for consumers. Unlocking the genetic secrets of plants and animals is critical to the future of U.S. agriculture. The National Food Genome Strategy promises to address the nation's needs for identifying, mapping, sequencing, and manipulating the genes responsible for those traits that are economically important to agriculture.

This investment in a National Food Genome Strategy will build on research work USDA is already doing in genetics. Most everyone is aware of the important advances made in understanding the structure and function of genes in humans. Similar advances also have been made for agriculturally important plants and animals.

One of the useful aspects of genetics has always been that much of the theory applies across organisms. We have entered a new era of understanding, however, on how gene content and even the gene order are similar within broad groupings of species. For example, we now know that if a gene is located on a chromosome of rice (the cereal with the lowest amount of DNA), the occurrence and chromosome position of that gene often can be predicted in grasses, including corn, sorghum, wheat, oats, barley, rye, sugarcane, millet, and even a forage grass.

USDA scientists, working with researchers from State Agricultural Experiment Stations and elsewhere have produced genetic maps of important animals like cattle, swine, sheep, and poultry and plants such as corn, soybeans, wheat, sorghum and others. But these maps must be and the underlying techniques need to be expanded and improved before their full potential can be applied to new crop and breed development. Additional gene "tagging" work is needed to improve the resolution of various maps and to isolate genes that govern desirable traits.

Even as a plant geneticist in the midst of genome research, I am amazed to think that we now have within reach the possibility of knowing every gene in an organism. The task at hand is not only to know the DNA structure of each gene, but also to know its product, how the synthesis of its product is controlled, and how that product affects the organism. We also need to learn how to efficiently manipulate these genes so that we can better improve the plants and animals on which we depend and to be able to respond more rapidly to crisis situations such as the occurrence of a new disease. There is increasing demand for crops designed for special purposes, such as corn that will give greater swine or poultry productivity. Genomics research will greatly facilitate development of such new products.

The National Food Genome Strategy will be designed to understand and map genetic traits of importance to agriculture. A small set of plants, animals, and microbes would be selected on the basis of their importance to agriculture and their scientific advantages and relationships. The competitive grants program proposed by the Administration would be part of a multiagency program, with USDA as the lead agency and with efforts to take advantage of international cooperation and public/private partnerships.

Access to genetic information, through gene sequencing and mapping and other research, is vital to the future health of American agriculture and forestry. The development of economically, environmentally, and nutritionally important traits will be much more dramatic if the scientific community has ready access to needed genetic data. The goal of open access to data is fundamental to the program.

With this new level of understanding—that what we have learned in one species can be more directly applied to another than previously presumed—makes it timely to develop a coordinated genome strategy to achieve the greatest return on the investment and maximize advancements in agriculture.

Mr. Chairman, I would be happy to answer any questions you may have about the National Food Genome Initiative.

STATEMENT OF JOHN CORDARO, ON BEHALF OF THE COUNCIL FOR RESPONSIBLE NUTRITION

A View from the Dietary Supplement Industry. The Food and Agriculture Act of 1977 was landmark legislation for human nutrition research. It designated USDA as the lead agency responsible for food and agriculture research and set specific research priorities. The Secretary of Agriculture was directed to establish nutrition research as a separate and distinct mission of the Department of Agriculture and to increase support for nutrition research to a level adequate to meet needs. Included within the findings of the Act, Congress declared ". . . that there is increasing evidence of a relationship between diet and many of the leading causes of death in the United States; that improved nutrition is an integral component of preventive health care; that there is a serious need for research . . . ."

These findings were derived from more than a decade of media and congressional attention on both hunger in America and the diet-disease relationship. Inclusion in the farm bill signaled an effort to include consumer health and nutrition interests in U.S. food and agriculture policy.

Now, 20 years later, it is appropriate to focus on how well our scarce Federal dollars have been spent; how successful these efforts have been; and what changes are needed to improve our management of Federal human nutrition research. My views have at least two biases.

First, I have been involved in human nutrition programs for more than three decades. I was a player in the events of 1977 as the food program manager in the congressional Office of Technology Assessment, where we published "Nutrition Research Alternatives," which provided substantive support for the human nutrition research sections of the Farm Act.

And second, as the spokesperson for the dietary supplement industry, I believe a higher priority needs to be given to expand the science base for a better understanding of the appropriate role of supplements in the diet.

The Dietary Supplement Industry: A Stakeholder for Consumers. One of the most significant differences in contrasting today with 20 years ago is the increasing recognition that credible science supports an appropriate role for supplements in the diet. The Nutrition Labeling and Education Act of 1990 and, most recently, the Dietary Supplement Health and Education Act of 1994 allow health claims for foods and supplements when science supports such claims. The science base that decision makers are to draw from is the accumulated storehouse of research results.

Unfortunately, when I review the few approved health claims for food and supplement products, I must question whether we have obtained the maximum return on the billions of dollars invested in our research effort. Further, when I note that consumers are either unaware of, do not use, or are skeptical about health claims information, I must ask whether the system is doing the job necessary to get the message heard and acted on.

Thus, I must conclude that consumers are not receiving full value for money spent on human nutrition research.

The bottom line of human nutrition research should be to enhance the health and well-being of Americans. To do so, research results must produce useful information that industry can employ to make better products and individuals can use to make more informed dietary choices.

The current system is doing far too little to get information to consumers and to prod the research community to address critical data gaps that must be filled to allow a health claim. Two dietary supplement examples illustrate this.

First, FDA has approved a claim that women of childbearing age should take folic acid, which could reduce by 50 to 70 percent the incidence of neural tube birth defects. Unfortunately, according to the Centers for Disease Control and Prevention (CDC), only 25 percent of women who are capable of becoming pregnant have heeded the message by taking folic acid supplements. CDC wants to double that number in the next five years, but lacks the funding to implement a national education initiative. Where is our nutrition education effort to get these research results to potential users?

Second, accumulating evidence suggests that vitamin E, at levels substantially greater than what one gets from diet alone, may reduce the risk of heart disease and cancer. These research findings are so promising that Federal agencies should focus greater research attention on further examining vitamin E's benefits and filling in the critical knowledge gaps to integrate results into public policy and consumer education.

Key Federal officials have lacked initiative and vision to seize upon vitamin E and other areas of exciting and promising research and health promotion opportunities. A different, more dynamic, open system must seek to expedite research opportunities, like vitamin E, that hold out the possibility of positive outcomes with significant public health consequences.

Conclusion. I urge the Forestry, Resource Conservation and Research Subcommittee of the House Agriculture Committee to take a page from history and support a White House conference on human nutrition research that focuses on potential prevention benefits and especially what needs to be done to apply research results in messages for consumers to use. Such a conference could help establish a national agenda for human nutrition research and education. Let's build on President Nixon's 1969 White House conference on Food, Nutrition, and Health, and set 1999 as the date to celebrate 30 years of progress.

The White House conference would be a new beginning and would be followed by biannual meetings to help monitor, implement, and modify our national nutrition research agenda. We need to continually ask "How well are we doing?"

To help prepare for the conference, I urge that a critical and independent evaluation of our human nutrition research and education effort be launched. This review by a blue-ribbon, broadly representative, independent panel should examine how Federal nutrition research is managed and coordinated and make recommendations for its improvement.

Taken together, these steps will prepare us for the challenges we will continue to face into the next century.

STATEMENT OF DR. BOB ROBINSON, ADMINISTRATOR, COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

I am Dr. Bob Robinson, Administrator of the Cooperative State Research, Education, and Extension Service (CSREES) at the United States Department of Agriculture (USDA). I am pleased to be here today to discuss the administration's position regarding the reauthorization of the research, education, and extension activities at USDA. Accompanying me are Dr. Ron Phillips, Chief Scientist of the National Research Initiative, who will highlight one specific initiative, the National Food Genome Strategy. Also with me today is Dr. Ed Knipling, Acting Administrator of the Agricultural Research Service (ARS). He will be available to answer any questions you may have at the end of the testimony.

I come to you today to discuss what we believe to be the most critical Federal mission in agriculture—research, education and economics. The continued success of U.S. agriculture, and indeed world agriculture, is dependent on knowledge. Agriculture operates in an interdependent global economy, driven by advances in information, communication, and biological technologies, and committed to the goals of environmental stewardship and improved human health. In this environment, the challenge of assuring an accessible and safe food and fiber system can be met only through the continuous development and application of new knowledge.

Agricultural research and education have long been the engine of productivity in American agriculture, providing an affordable food supply, assuring our comparative advantage in many areas of production, and substantially contributing to our balance of payments. Today, the public demands all that and even more of agriculture—to conserve natural resources, create more nutritious and better quality foods, and assure social and economic progress in agricultural and rural areas. Further, policy changes in the structure of support for commodity producers, international trade agreements, and environmental regulations, position the agricultural knowledge system as a critical element of the new "safety net" for agriculture and rural America.

Two fundamental challenges face agriculture. The first is how to achieve long-term sustainability in agricultural production through simultaneously achieving and maintaining profitability, minimizing negative environmental effects, and developing and improving strong rural and agricultural communities. Balancing these economic, environmental, and social factors requires new approaches to research and education that emphasize for integrated problem-solving. The Fund for Rural America competitive grants program authorized in the Federal Agriculture Improvement and Reform Act of 1996 (the 1996 Farm Bill) is one of those approaches; it is providing an opportunity to design new partnerships and linkages to develop and utilize research-based solutions to problems in the context in which they occur.

The second fundamental challenge facing agriculture is responsiveness to broad public concerns for safe, nutritious, and accessible foods. Recent legislation such as the Food Quality Protection Act of 1996 and public concern about improving food safety signal the need to develop new knowledge which can lead to improved production, processing, and consumer use practices that reduce both chemical and microbial contamination of food. Research—and education—are essential to maintaining public confidence in the safety of the food supply. These efforts also contribute to preserving and expanding export markets for U.S. agriculture. The President's fiscal year 1998 budget responds to these concerns and our request includes major initiatives for USDA in the areas of food safety and human nutrition, and we are pleased the House and Senate Appropriations Committees have responded to these priorities, although we urge that the initiatives be fully funded at the levels required in the President's budget.

Mr. Chairman, as we have examined options for the reauthorization of the Research Title of the 1996 Farm Bill, we have been working within this framework as follows:

A. Principles

The food and agriculture sector faces increasing complexity meeting the challenges of global markets, increasing concern about enhancing natural resource conditions and environmental quality, and supporting risk management. In the context of these challenges, the administration has adopted the following principles to guide the reauthorization of the research, education, and extension authorities:

(1) USDA and the Research, Education, and Economics (REE) mission area within it invest in creating and strengthening the research and educational capacity essential to meeting national goals for the food and agricultural system.

(2) The programs of the REE mission area are dedicated to maintaining world leadership and excellence in agricultural science and education.

(3) The Federal Government has a distinct role to play in partnership with state and local governments and the private sector.

(4) Wise strategy for public investment supports a diversified portfolio of funding sources and mechanisms as well as diverse institutions performing research, education, and extension.

Following the above principles, the REE agencies seek to accomplish the following goals through our legislative proposals to:

(1) position American agriculture to assure sustained economic growth providing producers with a reasonable profit while developing the technologies necessary to attain a sustainable, secure, and globally competitive agriculture;

(2) strengthen the problem-solving capacity of federally-supported, agricultural research, extension, and higher education programs;

(3) maintain and enhance incentives that build partnerships, as well as maximize the leverage of Federal investments, for agricultural research, extension and higher education;

(4) expand eligibility for competitive award of funds and to assure the best and highest use of Federal investments in the agricultural knowledge system, and

(5) assure program and budgetary accountability consistent with the REE strategic plan for achieving national and shared priorities for agricultural research, education and extension.

B. Legislative Proposals

1. Develop the technologies necessary to attain a sustainable, secure, and globally competitive agriculture.

1.1 We propose that Congress authorize a new, competitive grants program to invest in a National Food Genome Strategy, comprised of the Plant Genome Initiative and the Animal Genome Initiative.

The major challenges facing the United States in the 21st century are the needs for increased food production, a cleaner environment, and renewable chemical and energy resources. The United States values a safe and abundant food supply that meets consumer demands for safety and quality. Major increases in agricultural exports are required to meet the needs of the growing world population while ensuring U.S. competitiveness in agriculture and agricultural research.

The goal of the National Food Genome Strategy is an improved understanding of plant and animal (and their associated microbial) genes, their genetic capabilities, and their genetic structures. Identifying, mapping, and understanding the function and control of genes responsible for economically important traits in the major agriculturally important species of plants, animals, and microbes will permit the development of new genetic technologies for improvement in yield, composition, and quality of the domestic agricultural output. We propose that Congress authorize the program for $50 million for FY99, $50 million for FY 2000, $50 million for FY 2001, and $50 million for FY 2002.

The National Food Genome Strategy is a strategic investment in research that will fill gaps in existing knowledge to underpin the public and private investment in developing the technologies necessary for attaining the goal of a sustainable, secure, and globally competitive agriculture. Through accelerated research, the program will identify and develop a functional understanding of genes responsible for economically important traits in plants, animals, and microbes of importance to agriculture. Knowledge of genome organization and gene function is critical to ensuring future genetic improvement of agriculturally important species. The program will also support the preservation of diverse germplasm necessary to meet the changing environmental and market needs of the future while ensuring biodiversity, thereby maintaining future access to genes that may be of critical importance.

The technology by which agriculturally important genes can be identified has been clearly established. The National Food Genome Strategy will address gaps in knowledge that limit the development and implementation of gene-based approaches for plant and animal improvement. This knowledge gap can be filled by the mapping of expressed and agriculturally useful genes and by achieving an understanding of their function. Focussing on sequencing of expressed genes where sequencing whole genomes is not possible is a rapid and cost effective means for the goal of accelerating the pace of gene discovery. The careful selection of species in each agriculturally important group will lead to information applicable to related organisms. The National Institutes of Health has funded a similar approach to understanding the human genome. Human gene and genome characterization benefits animal agriculture, since human and animal genomes are similar and contain many genes with the same function. Scientists can learn much from comparing the maps and genomic sequences of both.

The National Food Genome Strategy encompasses two major initiatives. USDA would be the lead Federal agency, working with the National Science Foundation and the Department of Energy in the Plant Genome Initiative, which would focus on crop species of major agriculturally important plants. Within crop plants, the Plant Genome Initiative will compare the two major groups: monocots (grains such as corn, wheat, and rice) and dicots (legumes and most fruits and vegetables). By comparing monocot and dicot genomes, just like comparing the animal and human genetic maps, scientists will speed the advances in gene discovery in agriculturally important plant species.

The Animal Genome Initiative will take advantage of current, ongoing work at NIH on the Human Genome Initiative and the significant work on mouse genomes, and will further the progress achieved to date by the complementary work of the ARS and the State Agricultural Experiment Stations. Significant planning for the

Animal Genome Initiative is scheduled to occur in FY 1998, with competitive grants awarded in FY 1999-FY 2002.

1.2 We propose that Congress reauthorize the Regional Aquaculture Centers and National Aquaculture Act of 1980 with the following provisions:

1. Establish private aquaculture as a form of agriculture for USDA programs and activities.

2. Extend authorizations of appropriations for the Regional Aquaculture Centers and the 1980 National Aquaculture Act, which identifies the Secretary as the permanent chairman of the Joint Subcommittee on Aquaculture (JSA). The JSA is an interagency coordinating group for all Federal agencies working in support of national aquaculture policies and programs.

3. Establish a program to accelerate the transfer of promising research and technical advances, including environmental technologies, to commercial aquaculture applications.

Aquaculture is poised to become a major growth industry, and we propose that Congress extend authorizations of appropriations for the Regional Aquaculture Centers and the National Aquaculture Act of 1980 to improve prospects for this growing sector of the food and fiber industry.

Global demand for fish is projected to increase sharply over the next several decades, while harvests from wild-catch fisheries are stable or declining. A dramatic increase in aquaculture is needed to meet future demand, to offset a multi-billion dollar U.S. fish products trade deficit, and to offer consumers abundant supplies of high-quality, safe, wholesome, and affordable fish. The United States has an important opportunity to develop a globally competitive aquaculture industry to serve national needs and the international market. Sustainable, environmentally responsible aquaculture development holds particular promise for rural communities. New aquaculture technologies can create challenging, rewarding new jobs and foster rural economic development by stimulating new business ventures among small, rural and/or minority-owned companies.

2. Strengthen the problem-solving capacity of federally-supported, agricultural research, extension, and higher education programs.

2.1 We propose that Congress correct a technical flaw by providing funding for FY 1998 for the Fund for Rural America in addition to current funding for FY 1997 and FY 1999. The Fund is a multi-functional, multi-disciplinary, integrated approach to solving problems and filling gaps in knowledge.

Congress created the Fund for Rural America at the same time it fundamentally reformed Federal farm programs. The 1996 Farm Bill eliminated commodity program deficiency payments and replaced them with transition payments that will decline over 7 years. These policy changes are likely to have a substantial and dramatic affect on production agriculture by shifting price and income risk management away from government programs to individual farmers. At the same time, rural America is experiencing a major transition from agriculture-based economies to other sources of income and emigration. The current Fund for Rural America competitive grants program is designed to advance the findings of research into practical applications to address current and emerging problems and to develop new opportunities for the benefit of rural America and the Nation.

Current funding for the program made $100 million available on January 1, 1997, (FY 1997), October 1, 1998 (FY 1999), and October 1, 1999 (FY 2000). We propose that Congress amend the program to move FY 1999 funding to FY 1998 and move FY2000 funding to FY 1999, thereby closing a gap in the funding stream for the program.

2.2 We propose that Congress establish a new authority for an integrated applied research, extension, and education competitive grants program. The program would address national and regional issues, and would require a 100 percent nonFederal match for commodity or location specific activities.

This new funding mechanism would be an innovative, flexible way to manage existing agency and departmental initiatives, which increasingly involve multi-functional research and education activities, such as sustainable agriculture and Integrated Pest Management. New USDA research and education programs, developed as part of initiatives such as the Food Quality Protection Act, Managing Change in Agriculture, the President's Food Safety Initiative, and Risk Management also could be managed in a more efficient and coordinated manner under an integrated authority. Management of program resources would be streamlined and could be administered more flexibly at the universities' and other awardees' locations. For those programs not of a national or regional interest that are specifically designed to address the needs of a specific location or benefit a specific commodity, Federal grants would require a 100 percent nonFederal match.

A related proposal for an applied competitive research program was included in the 1995 departmental Blue Book for the Farm Bill. That proposal was designed as a substitute for the earmarked special grants program. Similarly, this proposal would achieve the goal of establishing competitive processes where earmarks currently exist, but would not supplant fully the section of the current special grants program under which focused national research programs such as global change, pesticide clearance, and emerging pest and disease issues, are conducted.

3. Maintain and enhance incentives which build partnerships, as well as maximize leverage of Federal investments, for agricultural research, extension and higher education.

3.1 We propose Congress amend Smith-Lever 3(b) and 3(c) authority to require that not less than 25 percent of Federal extension formula funds be used for multi-state, regional, or national collaborative activities, including distance learning.

This provision is parallel to the requirement in the Hatch Act, which requires that 25 percent of Federal research formula funds be spent for regional research activities. A regional or multistate emphasis for Federal extension funds will encourage greater focus on sharing of resources, will lead to efficiencies, and will better leverage the Federal investment. This amendment would implement a recommendation of the National Research Council (NRC) report on Colleges of Agriculture at the Land Grant Universities, by realizing organizational efficiencies to broaden and deepen the Cooperative Extension System's (CES) expertise, access, and relevance. This amendment would facilitate regional, bioregional, landscape and other broad scale approaches to program development and delivery and could reduce redundancy and create efficiency in State programs. In addition, this amendment may help sustain small institutions.

Administrative action by CSREES will be needed to establish a system for joint decision-making, review, and approval of multi-state, regional and national projects, and some distance learning activities, in consultation with the state extension services.

3.2 We propose Congress amend the Smith-Lever extension formula program and the Hatch research formula program to permit a Land Grant University to redirect up to 10 percent of total research and extension formula funds to any research or extension purpose, with an approved plan of work. The goal of this amendment is to provide Federal funding to states in a more flexible manner so states can meet high priority needs and to permit states to better leverage their resources. This flexibility would be increased from 10 percent for FY 1998, to 15 percent for FY 1999, 20 percent for FY 2000, and 25 percent for FY 2001 and FY 2002.

In addition, 25 percent of the appropriations above the FY 1997 levels for research and extension formula funds would be distributed to Land Grant Universities in a single allocation. The single allocation would increase from 25 percent in FY 1998 to 40 percent in FY 1999, 60 percent in FY 2000, 80 percent in FY 2001, and 100 percent in FY 2002. These funds may be used for either research or extension, with an approved plan of work.

By providing greater flexibility to state institutions to use the Federal investment for high priorities—with appropriate accountability—the Federal investment may be leveraged more effectively. This flexibility would be particularly useful for responding to emergencies and new and emerging needs.

3.3 We propose Congress amend the authority for International Agricultural Research and Extension activities (Section 1458 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977) to clarify that the section applies to higher education and teaching as well as research and extension activities.

Understanding the global market is of increasing importance to the future of American agriculture. Clarifying authorities for higher education and teaching activities will permit U.S. universities to strengthen their programs to assure the continued excellence of graduates of the food and agriculture programs of all colleges and universities.

3.4 We propose Congress amend Section 1473A of the National Agricultural Research, Extension and Teaching Policy Act of 1977 to permit REE agencies to enter into cost-reimbursable agreements with all universities and colleges.

Current authority restricts this authority to land-grant colleges only. Expansion of the authority permits USDA to acquire goods and services on a cost-reimbursable basis from diverse institutions when there is a mutual interest in carrying out research, education, and extension activities.

3.5 We propose Congress amend the National Agricultural Weather Information System (NAWIS) Act of 1990 (as amended) to establish a partnership between the National Weather Service (NWS), USDA, agricultural experiment stations, extension services, and state and regional climate programs to operate a National Agricultural Weather Information System (NAWIS).

The elimination of all NWS agricultural weather programs has had a significant negative effect on agriculture. In April 1996, the NWS closed all agricultural weather service centers, terminated all agricultural advisories, and eliminated liaison and cooperation with county and state extension and experiment stations programs and land grant universities.

Current authority under Section 1638(b)(4) would be amended to provide that NAWIS would be administered by the chief meteorologist at USDA, to authorize the Secretary to enter into cooperative agreements, grants, and competitive grants in order to collect weather data, and to conduct cooperatively weather-related activities.

4. Expand eligibility for competitive award of funds and assure the best and highest use of Federal investments in the agricultural knowledge system.

4.1 We propose Congress amend Smith-Lever 3(d) to expand eligibility from 1862 Land Grant Universities only to 1862, 1890, and 1994 Land Grant Universities. In addition, where competition is deemed appropriate to achieve the goals of the program, competition would be open to all Land Grant Universities as well as other established colleges and universities in the United States.

The Smith-Lever Act (1914) provides for cooperative extension work between the USDA and the land grant universities. Appropriations for the 1862 universities are authorized by Smith-Lever 3(b), (c), and (d). Appropriations for extension work at the 1890 institutions are authorized in the National Agricultural Research, Extension, and Teaching Policy Act of 1977. 1890 institutions do not directly receive Smith-Lever 3(b) and (c) funds. With passage of the 1996 Farm Bill, 1890 institutions became eligible to receive a share of any new or increased 3(d) funds.

Distribution of Smith-Lever 3(d) funds varies across special emphasis programs as formula, competitive, or a combination of awards. This amendment would assure that universities with land grant status, including the 1890 institutions and 1994 institutions, can participate in the program. In addition, this amendment is designed to improve equity in access and assure the best and highest use of Federal investments in the agricultural knowledge system by expanding eligibility for competitive award of funds. Where competition is deemed appropriate, other United States colleges and universities—including the Hispanic Serving Institutions—could compete for funds through nationally competitive processes for implementing special emphasis extension programs. It would contribute to enlarging the pool of expertise, creating and implementing extension efforts that would expand partnerships for more efficient problem solving.

4.2 We propose Congress amend the National Agricultural Research, Extension, and Teaching Policy Act of 1977 to phase-in nonFederal matching requirements for 1890 formula programs in support of extension and research.

The amendment would establish a two-part formula allocation for 1890 programs with a nonmatched and a required match component. The phase-in schedule would begin in fiscal year 1999 with an 80 percent of the formula allocation requiring no match and 20 percent requiring nonFederal matching. In fiscal year 2000, the split would be 70/30 percent; fiscal year 2001, 60/40; and fiscal year 2002, 50/50. NonFederal matching funds could be directed to agricultural research, extension, or teaching programs at the discretion of each 1890 institution. Where 1890 institutions fail to meet nonFederal matching requirements for receipt of formula funds, allocations would revert to the Secretary of Agriculture for support of agricultural research, extension, and teaching programs at 1890 institutions.

The purpose of this amendment is to enhance the resources for agricultural research and extension at 1890 institutions and Tuskegee, while not jeopardizing substantially those programs which may need a transition period to develop state and other support. The NRC report recommended requiring a state match for Federal formula funds at 1890 institutions, consistent with requirements at the 1862 institutions.

Many institutions would encounter substantial transitional issues if full matching requirements were instituted immediately. The goal of requiring a match is to assure program equity, leveraging, and increased funding stability for 1890 institutions. Impact of the matching requirement would vary with the current organizational structure and funding of the land grant university system within a state.

4.3 We propose Congress eliminate the matching requirement for Equipment grants under the NRI to better enable capacity building activities at small universities (less than 15,000 students) and in states eligible for the Experimental Program to Stimulate Competitive Research (EPSCoR).

Small universities and those that participate in the EPSCoR program are eligible for USDA's strengthening program, which is designed to assist universities in developing core capacities to conduct research and education activities. Eliminating the nonFederal match requirement makes it easier for these entities to qualify to compete for these scientific equipment grants.

5. Assure program and budgetary accountability consistent with the REE strategic plan for achieving national and shared priorities for agricultural research, education and extension.

5.1 We propose Congress require accountability for all USDA-administered extramural research, extension, and higher education funds through the Government Performance and Results Act process to the strategic goals of CSREES and the mission area.

Section 1402 of NARETPA would be amended to add the five goals of the REE strategic plan:

1) an agriculture system that is highly competitive in the global economy;

2) a safe and secure food and fiber production and distribution system;

3) a healthy well-nourished population;

4) an agriculture system which enhances natural resources and the environment; and

5) enhanced economic opportunity and quality of life for Americans.

A second section would be added to the purposes that describes management principles for USDA's research, education, and extension programs, with accountability included as a principle.

5.2 We propose Congress require recovery of indirect costs for all competitively awarded USDA research grants and integrated (research, education, and extension) grants be capped at 25 percent of the total grant award. This amendment would increase the current cap of 14 per cent for indirect recovery costs for competitively awarded research grants with a higher cap across all competitively awarded research and integrated grants.

The current indirect cost recovery cap of 14 percent of the total Federal award applies only to competitively awarded research grants and is established by a general provision in each fiscal year's appropriation act. The proposal to increase the cap to 25 percent and to apply it to all competitively awarded research grants and integrated (research, education, and extension) grants would 1) more closely align the cap with the negotiated indirect rate cost at many institutions; 2) eliminate incentives for applicants to choose a grant program based on the indirect costs permitted; and 3) streamline the administration of competitively awarded programs at USDA.

5.3 We propose Congress no longer consider a 1995 blue book proposal to establish a competitive grants program to fund university building and facilities projects.

Moving to a cap of 25 percent for indirect cost recovery on competitively awarded research and integrated grants will partially eliminate barriers to participation in USDA programs by some universities and agencies, encourage full and sustained efforts, and be consistent with other agency policies. This action is consistent with expanding the expertise addressing research and extension priorities in agriculture. The 1996 Farm Bill established the Strategic Planning Facilities Task Force to develop guidance for the Department relative to Federal support for research facilities. Pending completion of the work of the Task Force, the Department's policy in general will be to fund programs over bricks and mortar, as demonstrated by the President's FY 1998 budget request. The move toward greater reimbursement of indirect cost recovery should allow institutions to capitalize some facility costs.

STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION PRESENTED BY WILLIAM KNILL, PRESIDENT, MARYLAND FARM BUREAU

Mr. Chairman, my name is Bill Knill. I am a Maryland farmer and serve as President of the Maryland Farm Bureau. I am pleased to speak to you today on behalf of the American Farm Bureau Federation.

There are two questions that need to be addressed as you consider the reauthorization of the research title of the farm bill. The first is whether a strong Federal commitment to agriculture research is still justified. Secondly, if a strong commitment is justified, how should the existing research, extension and education system be changed to best meet the needs of producers and consumers into the 21st century?

It will probably come as no surprise that we believe a strong Federal investment in agricultural research is as important now as it has ever been. A growing world population and generally increasing standards of living across the globe will require that food production continue to grow. A strong, competitive advantage for American farmers in a rapidly growing marketplace is not a foregone conclusion, unless we continue to stretch our imaginations and knowledge base to make it happen.

The track record of past U.S. investment in agricultural research makes a strong point for continuing and building upon that investment. This investment has helped farmers and ranchers to provide consumers with the safest, least expensive, most bountiful food supply in the world. Americans spend a lower percentage of their disposable income on food than all other countries. This does not happen by accident. It is a testament to the effectiveness of the research and technology transfer system in the U.S. and the ability of producers to apply the results of that research to benefit all Americans.

As we look to the future, the American farmer is being called on to place greater reliance on the markets rather than government programs and to be a major player in world markets. We support this change and welcome the opportunities it presents, but we need the support of an active, innovative agricultural research program if we are to maintain and enhance our competitive edge in world markets. Continued research and technology transfer is also vital as we seek to address current consumers' concerns about environmental, food safety and nutritional issues and new ones which are certain to arise in the future.

The FAIR Act of 1996 reduced government spending on agricultural programs. Implicit in this change was a commitment to reduce the regulatory burden on producers and to provide the needed research to facilitate this move toward reliance on the market. Producers have honored their commitment to the agreement with their support of the act. Now it is Congress' turn to honor it by providing a research system that meets the long-term needs of production agriculture and the funds needed to operate it.

If you are convinced, as we are, that the Federal Government needs to continue and expand its commitment to agricultural research, then the next logical question is how we can best provide a sound, sophisticated, well-managed, and well-funded food and agricultural research, extension and education program.

Overall, there are many strengths in the existing institutional structure supporting agricultural research, education and extension programs. The reauthorization process should not harm the parts of that structure that have provided great value to producers and consumers of agricultural products. But neither should we assume that in the future we will need all of the same programs and facilities that have been utilized in the past.

Mr. Chairman, when I think about the future of our agricultural research system—and the contributions this system has made in the past—it would be easy to request a simple reauthorization. It would be easy to say, "if it ain't broken, don't fix it." But that would also be ignoring the fact that recent changes in agricultural policy, both domestic and global, will increase the need for greater output from the system and increased cooperation among all public and private research and extension organizations. The issue reminds me of one of Thomas Jefferson's remarks etched on the wall of the Jefferson Memorial. It says, "I am not an advocate for frequent changes in laws and constitutions. But laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinions change, with the change of circumstances, institutions must advance also to keep pace with the times. We might as well require a man to wear still the coat which fitted him when a boy as civilized society to remain ever under the regimen of their barbarous ancestors."

It is paramount that all Federal research, extension and education funds be administered in a system that provides greater accountability and is relevant to the problems currently facing agriculture. Most of the following recommendations focus in some form on the three issues we believe to be most important to the debate—-adequate industry input throughout the priority setting, budgeting, implementation, and review stages along with relevancy and, accountability. If these issues are addressed, we believe the opportunity to secure increases in funding requests in the future is more likely. Let me highlight some ideas on each of these issues:

Industry input—if industry input and the structure and responsibility of the Advisory Board can be enhanced, we believe it will ensure more relevancy and accountability. To that end, we recommend that the majority of the members the Advisory Board consist of producers or industry representatives. We also suggest a wider variety of priority setting mechanisms be forwarded to the Advisory Committee for their consideration rather than the current practice of having them only evaluate the REE strategic plan. In addition, we believe each land grant university or other non-Federal recipient should be required to establish and implement a process for obtaining stakeholder input concerning the use of funds prior to them receiving Federal funds for agricultural research and extension.

Relevancy—a standard should be established for federally funded competitive and intramural agricultural research, extension and education. The research should address high priority topics which are based on priorities set by the National Advisory Board with significant input from stakeholders. In addition, there should be a merit review of each extension and education project competitively funded by the Federal Government.

Accountability—for research activities, Federal funds should only be spent if the project has undergone an independent scientific peer review. For extension and education activities, Federal funds should only be spent if the project has undergone an independent merit review. Also, those who receive Federal funds should be required to submit a report annually describing the results of the activity and the merit of the results. We also believe the Secretary of agriculture should develop guidelines for ensuring the performance of research and extension to determine whether the federally funded programs result in public goods that have national or multi-state significance.

FUNDING ISSUES. Allocation The research portfolio should contain an appropriate mix of intramural and formula funding, as well as competitive and special grants. We do not believe it is possible to significantly alter the current funding mix during this legislative debate. We do, however, believe that the allocation of each funding component should be seriously assessed in the near future to ensure the most efficient use of available research dollars.

Funding Review Task Force With the ongoing work of the Facilities Review Task Force, there could not be a better time to establish a Funding Review Task Force. While we do not advocate establishing numerous new task forces or advisory boards, we do believe this task indeed warrants an additional task force for a limited period of time, hopefully not to exceed 18 months.

The mission of the task force would be to review all Federal agricultural research funding components to (1) compare the adequacy and efficiency of current components; (2) analyze funding levels, approval procedures, and needs for each REE mission area, including intramural research; (3) identify opportunities for and application of non-REE Federal funds from other USDA agencies, other Federal departments, state agencies, and the private sector; and (4) provide recommendations for changes in current funding arrangements including funding for capital construction, improvements, and equipment.

The task force should be composed of 15 voting members representing a geographic diversity and five non-voting, ex-officio members. A minimum of five voting members should represent production agriculture and a minimum of five should represent the agricultural industry. Other interested sectors would make up the balance. Ex-officio members to be appointed by the Secretary of Agriculture would include one representative each from REE, ARS, CSREES, ERS, and NASS. Voting members should be appointed by the Senate and House Agriculture Committees.

Limit Federal Funds to National or Multi-State Priorities. Federal money spent on research and extension should be utilized to address high priority production-related topics that have multi-state or national relevance. Federal support is also justified when the commercial markets for the research products are too small for adequate private gain or when the private sector's incentive to invest in research is otherwise low in relation to the anticipated benefits to producers and consumers. The House Agriculture Committee should provide leadership to assure that funding for agricultural research increases at rates comparable to that for NSF and NIH. Federal dollars should be leveraged with state, local, industry, and other Federal funds from non-REE agencies wherever possible.

The benefits of this type of approach are numerous. First, many of our current problems (i.e. water quality, nutrition, and food safety) have little or no location specificity. Even within the farm sector, production issues are often pertinent to producers in a region that comprises all or parts of several states or regions in several noncontiguous states. Under a dwindling budget scenario, universities cannot continue to attempt to be everything to everybody. Regional and multi-institutional collaborations would enable individual institutions to become more specialized. Increased specialization would also reduce unnecessary replication of programs within the national system.

In addition, as funding resources remain under budget pressure, these partnerships will allow smaller, less well-supported universities to survive. Given the latest computer technology and information systems dissemination capabilities, future research on a multi-state level should be even easier to coordinate.

Last, but not least, encouraging widespread participation offers diverse ideas, perspectives, values and cultures. In the past, the system has benefited from the synergetic ideas of a wide variety of participating scientists. It should continue to benefit in the future.

Enhancing Multi-State Cooperation. The Federal formula and competitive grants outlays for research and extension should be structured so that at least 25 percent of those funds are allocated to programs and projects that effectively integrate and mobilize multi-state and multi-institution resources. If grantees cannot utilize their full 25 percent allocation, the remainder of unused funds should be transferred for use under the National Research Initiative (NRI) for multi-state and multi-institution projects.

Matching Federal Formula Funds. In the interest of equity and the importance of the clientele served by 1890 colleges, states should be required to phase in a match of Federal formula funds to these institutions just as they are required to do for funding to the 1862s. The 1890's and the 1994's should also be encouraged to compete for competitive funding.

Funding for Extension. Extension plays a vital role in disseminating knowledge and has served the Nation well, but it needs to be reinvigorated and improved in order to meet the needs of the future. While many of the traditional functions of extension are being filled or supplemented by the private sector, new demands in both traditional and non-traditional areas of agriculture provide the opportunity for outreach programs to continue their relevance. Increased emphasis on management and marketing as well as developing knowledge and providing unbiased analysis of privately developed products is a critical function for extension relative to production agriculture. Unfortunately, funding limitations coupled with increased non-traditional agriculture demands have tended to reduce the capability of the extension programs to adequately address historic mission responsibilities.

We believe that Federal funding for extension should be directed to issues that are of economic importance to production agriculture recognizing that the majority of extension funding originates with the states who will establish specific priorities for non-Federal funds. Some have misinterpreted the term "production agriculture" narrowly to mean "agriculture production". Certainly, that was not our intent. We believe the economic viability of agricultural production will depend heavily on post-harvest handling and shipping, value added processing, packaging, and marketing. Future trading and international competitiveness of agricultural products will depend on our ability to meet food safety standards and many trade debates will center on sanitary and phytosanitary standards. To remain competitive and viable, agricultural producers need to understand international trade and international markets, as well as business and investment opportunities overseas. Agricultural producers will continue to face challenges to meet environmental regulations and standards. They will continue to need science-based tools to cost-effectively manage their resources. The public will continue to demand a food supply that is not only affordable, but also nutritious and safe. We must continue to address all of these issues under the tent termed "production agriculture".

Memorandum of Understanding. Extension has been called on to deliver increasing numbers of social programs. We recognize that they are important, but these programs should not drain funds from production agriculture. The Department should aggressively pursue Memorandum of Understandings (MOU's) with other departments and agencies to provide funding for those efforts that are consistent and appropriate with Extension's mission.

Funding Flexibility. The Administration needs additional flexibility to react quickly to emergency situations when they arise. Three recent examples that have had significant impacts on producers are Karnal bunt, ergot in grain sorghum, and vesicular stomatitis. USDA was able to shift part of their research effort to address problems in these areas. As we look to a research system for the future, we need to ensure that this type of flexibility is maintained. While the Secretary has certain existing authority to shift funds from one agency to another in health emergencies, he needs additional authority to allow the research, extension and education services to focus on specific emergencies which are deemed to severely impact production or markets. In addition, the Secretary should be able to provide longer term commitments to addressing those situations after the imminent threat has been resolved. However, we are concerned about giving the Secretary complete discretion on how to spend such an "emergency reserve fund." In order to ensure the funds are truly spent on an economic emergency, we support the Advisory Board having approval authority over any expenditure for a project that will last more than a year.

MERIT REVIEW AND ACCOUNTABILITY. To ensure that Federal research funds are targeted to projects that address priority areas, and are also both scientifically and technically meritorious, we suggest that the review process be modified in the following manner. An initial brief submission should be required that would allow screening for projects which do not meet the priorities to be addressed, or which appear to lack technical merit. It would also provide an opportunity to identify and encourage collaboration between institution with similar proposals on a final submission that could likely be stronger than either individual proposal. The review panels that evaluate these projects must include individuals with expertise to judge the scientific merit of the proposals and also producer or producer representatives to bring a "real world" perspective to the process. Care must still be taken that the process does not become too restrictive. Scientists must be able to explore ideas that may be currently unpopular, as well as those that no one else has yet imagined. This freedom is critical to continued progress in agricultural research.

Technological advances, and other considerations, will influence the proper mix of basic and applied research. Taxpayers and Congress need assurance that the dollars spent on research are for relevant projects, but we still must provide for innovative, potentially breakthrough basic research. All branches of our research infrastructure conduct some basic research. Funding is provided, and should continue to be provided through a variety of sources. The competitive grants in the National Research Initiative (NRI) provide for basic research and long-term efforts that are primarily high-risk but which have potential high payoffs. These are usually the types of effort that private funding is reluctant to undertake due to the uncertainty of the payoff, but which are vital to future efforts.

While it is important that Federal research dollars are used on projects that have merit, individuals and institutions receiving grants must demonstrate accountability. To accomplish this objective, projects should not receive continued funding without evidence of progress and new projects for scientists who have not produced on previous projects should undergo additional scrutiny. We recognize that not all projects bear fruit, but the scientist must demonstrate that they did what they were funded to do and that the results of the work were reported. At times what is perceived as a negative result, still is valuable information to have.

National Agricultural Research, Extension, Education and Economics Advisory Board (Advisory Board). A key issue in establishing research priorities is determining who should "drive" the process, and developing the means by which that process can maintain its relevancy on an ongoing basis. The Advisory Board, established as part of the 1996 farm bill, was designed to replace several advisory committees which had either become redundant or failed in their efforts to provide advice.

In our view, the primary causes of failure of the former advisory committee system was the concentration of membership being vested in system personnel— administrators and scientists— who may regard process as being equally important as outcomes and a lack of communications between committees. In order for the system to be responsive to real world research, extension and education needs, the system stakeholders must play a larger role in establishing priorities and reviewing the system's progress in achieving results. We believe a majority of the Advisory Board membership should be composed of producers and industry representatives. As we move in this direction care must be taken to assure that there is an equitable distribution of producer representation by commodity and geographic region.

In the process of identifying potential members of the committee, the Secretary should consult with and solicit nominees from the House Agriculture Committee and the Senate Agriculture, Nutrition and Forestry Committee, in addition to groups and individuals who were previously asked to provide nominations. We recognize that this is an advisory committee to the Secretary who has final responsibility for the selection, but the above process should provide useful input to assure that a variety of perspectives are considered in the process.

Advisory Board Duties. The primary role for the committee is to establish priorities and evaluate the research, extension and education agenda. They need to develop partnerships between government, producers and industry. In order to do this they must:

1. Review and provide consultation to the Secretary and the Congress on long-term and short-term national policies and priorities relating to agricultural research, extension, education, and economics.

Congress, through the research title of the 1996 farm bill, established broad goals for the national research system. The Government Performance and Results Act (GPRA) should enable the funding for intramural projects and competitive grants to be tied to those priorities. The challenge continues to be translating these priority-setting processes into resource allocation decisions at the state and regional levels.

At present, federally sponsored research projects (including, but not limited to formula funds and special grants) have no uniform, industry or congressionally accessible measure of accountability in terms of how funding has been used by institutions or whether the funds have been devoted to research issues for which Federal support is justified. There is generally no accessible public record, including the Current Research Information System (CRIS) that documents and provides a rationale for the specific uses of formula funds.

2. Establish long-term and short-term national policies and priorities relating to agricultural research, extension, education, and economics. In establishing these policies and priorities, the Advisory Board shall solicit opinions and recommendations from a wide variety of sources. Agricultural research, education and extension programs need stronger linkages with end users of research and related activities to ensure a close connection between the funding, prioritization and accountability of such programs. Sources should include:

(a) persons who will benefit from and use federally funded agricultural research, extension, education, and economics;

(b) state stakeholder groups. Priority setting most often needs to begin at the state level and include a broad range of interests. An example of an effort that has worked well is the Council on Food and Agricultural Research (CFAR) in Illinois. This group, which includes approximately 50 organizations representing a wide variety of stakeholders, assists in identifying research priorities and provides feedback to those conducting the research. The education done by CFAR has also helped to increase public and political awareness of the need for and benefits of agricultural research.

We believe such a research advisory committee should be established in each state to assist in determining future research priorities. We encourage you to require the Secretary of Agriculture to establish a model to be used in setting up the state advisory committees. The committees should be composed of all interested stakeholders, but in no circumstances should producers or industry represent less than 50 percent of the committee. The committees should not have implementation or enforcement authority, however, the Secretary and the Advisory Board should give strong consideration to the recommendations of those committees in administering the research programs. It is important to note that we do not believe "one size fits all" and therefore encourage a model which sets parameters, but does not dictate exact memberships. Certainly, different structures are likely to be necessary in different states. In addition, if state stakeholder input is already working, we do not want to reinvent the wheel.

(c) organizations representing agricultural producers and industry;

(d) sector recommendations, such as the Belt-wide Cotton Conference, Sorghum Research Conference, and the Corn Utilization Conference;

(e) symposia held to establish recommendations regarding priorities, such as the Farm Animal Integrated Research (FAIR95) , its follow-up FAIR2002, the Coalition for Research on Plant Systems (CROPS 99), and the American Association of Nurserymen symposia. We urge the Advisory Board and USDA not duplicate existing efforts, but rather incorporate ongoing projects such as FAIR '95, and CROPS '99. They provide a national model of the type of effort that is needed. In each case, they bring together broad-based groups of stakeholders and define priorities that meet the needs of those being served. The results from these efforts should be used to pull together a comprehensive national plan of action;

(f) from the scientific community; and

(g) regional stakeholder groups, such as the five regional aquaculture centers. They are administered by USDA in association with colleges and universities, Federal and state agencies and facilities, nonprofit research institutions and private corporations. Their mission is to support aquaculture research, development, demonstration, and extension education to enhance viable and profitable U.S. aquaculture production. Selected projects concern issues that cannot be addressed by a single institution and are of importance to aquaculture development in two or more states or territories within a region.

3. Evaluate the results and effectiveness of agricultural research, extension, education, and economics with respect to the policies and priorities.

4. Review and make recommendations to the Under Secretary of Agriculture for Research, Education, and Economics on the research, extension, education, and economics portion of the draft strategic plan required under GPRA.

5. Review the mechanisms of the Department of Agriculture for technology assessment.

6. Establish priorities for research within each of the broad funding categories for the National Research Initiative, the Cooperative State Research, Extension, and Education Service, the Economics Research Service, and the Agricultural Research Service.

7. On an annual basis, review the Inspector General's report on the financial and performance audits of Federal research projects and make recommendations to the Secretary and the Congress for ensuring that Federal research funds are spent in a cost-effective and efficient manner on priority areas.

The agricultural research system needs a dedicated financial and performance review process to ensure both a thorough accounting of Federal and matching funds spent per priority area as well as an analysis of the performance of the projects in each priority area. These annual reviews should include all research costs, the portion allocated to Federal funds, the percentage of Federal funds utilized for fixed overhead costs, the generic sources of matching funds, actions taken to avoid duplicative projects and programs, the direct and indirect costs allocated, and such other pertinent information deemed necessary for an objective evaluation of the projects.

The Department should use the Government Performance and Results Act as a model when establishing the agricultural research financial and performance audit. It should be conducted under the auspices of the USDA Office of the Inspector General.

8. Recommend to the Secretary of Agriculture the priorities for the Fund for Rural America.

FUND FOR RURAL AMERICA (FUND). In our proposal for the Fund, it would be utilized for a limited number of priorities which address complex problems which require a significant initial investment, cooperation and collaborations between the private and public sectors, among state and Federal Governmental organizations, between Federal and university research facilities and among diverse academic disciplines. We believe this approach, when coupled with resources from other research programs, can yield significant results in the shortest amount of time on topics important to the future of U.S. agriculture , without several reducing our ability to address existing research priorities. In addition, this design can build a constituency for the Fund and encourage its review as a potential model for ensuring greater cooperation, and accountability within all agricultural research endeavors.

Background. The Fund, authorized under the 1996 farm bill, provides $100 million annually for fiscal years 1997, 1998 and 1999. One third of the fund is dedicated to research, education and extension grants. The grants are awarded on a competitive basis and are not targeted to specific priorities. One third of the fund is dedicated to rural development. One third of the fund is to be used at the Secretary of Agriculture's discretion for either research, education and extension, or rural development, or both. For FY97, the Secretary designated the discretionary $33 million in the following manner:

$20.5 million for rural development; $10 million for USDA research priorities; and $2.8 million for a new competitive grant research program to examine ways to improve delivery of agricultural knowledge to rural communities.

During consideration of the supplemental appropriations bill, the Fund was reduced by $20 million. Since there was only $46 million in FY 1997 for research, extension and education projects, this reduction cut those programs by almost 50 percent. With over 2,000 applicants vying for the competitive research grants program funds included in the original $46 million outlay, this will significantly reduce the amount of research which can be undertaken.

Authorization of the Fund. We recommend extending the authorization for the Fund from FY99 to FY 2002 with an annual authorization of at least $50 million for rural development and $50 million for research, education and extension programs.

In order to get the new program underway, and hopefully to avoid unnecessary delays in funding of grants, we propose that for FY 1998 and FY 1999, the entire $50 million for research, education and extension would be spent on the following six priority areas (with equal funding for plant and animal projects):

(a) National Food genome project, (b) Food safety and quality(c) Maintaining and enhancing the environment (d) Economically significant value added products, (e) International competitiveness, (f)Precision agriculture

For FY 2000 and thereafter, the Advisory Board would designate no more than six priority areas for the Fund that are consistent with national priorities identified by the Board.

We suggest the Advisory Board establish a panel for each of the five priorities to recommend to the Secretary of Agriculture the desired projects to be solicited in a request for proposals under the Fund. The panels should include representation from the Advisory Board, as well as farm and commodity groups, private industry, universities, private research organizations, and Federal agencies.

The grants will be available to national or multi-state consortia of public and private entities with an established and demonstrated capacity to perform research or technology transfer. The grant shall be used to develop and deliver on a timely basis specific desired products.

In order to further improve stakeholder input, we recommend the Secretary publish the request for proposals in the Federal Register. A competitive merit review process to select the projects to receive the grants should be established. Priority should be given to projects that leverage funds from other Federal, state and/or private sources and to those who integrate research, extension and education in their proposals.

In summary, we believe a strong constituency for the program can be built by modifying the Fund in the manner suggested.

SUMMARY. I close with a point that represents a belief that many farmers have expressed many times. We believe agriculture has already sustained many billions of dollars in cuts to farm programs. This has been done with the understanding that a significant portion of those funds would be reinvested in programs that could give us a better chance to be competitive in an increasingly competitive global agricultural economy. We took that as a commitment and will work hard to see that this commitment is met.

We believe it is now time for Congress to honor its commitment to American farmers. There are many reasons to be excited about the future of production agriculture. But we will not realize that bright future and compete as effectively as we can and should if we do not have the benefit of a strong food and agricultural research, education and extension program. We ask for your help.

We are eager to assist you in your efforts to craft a research title that ensures a growing and efficient food and agricultural system for the United States into the 21st century.

STATEMENT BY DAVID ERICKSON, PRESIDENT, AMERICAN SOYBEAN ASSOCIATION

Thank you Mr. Chairman. I am David Erickson, a soybean and corn farmer from Altona, Illinois and President of the American Soybean Association. It is a pleasure to be here today to talk to you about agriculture research.

Before being elected President of ASA, I served in several capacities on the ASA Board. One of the tasks I had was serving as chairman of the Research Committee. During that time, I learned a great deal about agriculture research and saw first hand the successes of our system and some of the problems.

As you may know, soybean producers support a National Soybean Check-off program that spends about $12 million dollars annually on research. Soybean growers also support research through their state check-off programs. For example, my home state of Illinois invests $3.5 million annually of farmer dollars on research. Research is a priority for soybean growers, and we are investing our own dollars to prove it.

State organizations across the soybean producing region have developed their own process for working with Federal, state, and land-grant institutions, and private companies, to set research priorities and funding guidelines. States have also joined forces to leverage dollars and to work on regional issues and problems. For example the ten southern soybean states hold an annual meeting where major regional research issues are reviewed, discussed, and prioritized. Producers, researchers, county agents and other interested groups are involved.

The eight north central soybean states have also organized a regional group that meets several times a year to set regional priorities for research. We also work on multi-state issues. In addition to working with this North Central Consortium, Illinois has joined with Iowa to address soybean research needs and priorities. The two state associations work closely together to leverage funds and avoid duplication. Although this formal relationship is rather new, soybean farmers already are seeing the results of having two of the largest soybean producing states pooling resources. Some of the projects targeted by the states include accelerating transformation and regeneration of the soybean gene, and combating major problems such as soybean cyst nematodes and white mold.

Soybean producers in all states are doing a good job of identifying state and regional research needs and setting priorities. However, there is still a strong role for the Federal research system to assist in identifying national needs and priorities. The USDA research system must also keep up with many changes in agriculture worldwide. One half of the U.S. soybean crop is exported, thus U.S. farmers must remain competitive if not one step ahead of our foreign competitors. Because the greatest benefits from new technologies are reaped in the first years of adaptation, the latest technology and science must be available to U.S. soybean producers.

One example is , genome mapping. I know all of you have heard a lot about genome mapping for one crop or another. In order to remain competitive, soybeans, as well as other major crops, must be genome-mapped. Genes with the greatest benefits need to be identified by the public research community so this information will be available to all researchers without restrictions imposed to protect proprietary interests.

Another key area is biotechnology. Although much of the current research is being done in the private sector, there is an important role for public research. Also, public/private partnerships must be developed to give U.S. farmers the best, affordable research with accessible results.

There is a strong need for public research in developing and commercializing value-added products and by-products. Soybean farmers have always invested in new and value-added uses of soybeans. And we have been successful in broadening our market base. However, there is still research to be done and there is a role for the Federal research system in developing new products and getting them to the market.

There are other areas where the Federal research system must respond to the needs of agriculture, including bringing precision farming to all producers and helping find answers to growing environmental demands. In order to best meet these needs and others, producers must be a part of the decision making and prioritizing processes. There does not have to be a new formal structure established that will only add another layer of bureaucracy to an agency that is bureaucratic enough. However, there should be a procedure established for USDA's research agencies to obtain input from, and provide adequate feedback to, producers.

One way to obtain more direct input from producers is to change the make-up of the National Agricultural Research, Extension, Education and Economics Advisory Board. ASA feels this Advisory Board should be more representative of production agriculture and the agribusiness community. A majority of any USDA advisory board should not be employees of the agencies or institutions being reviewed. Regulators cannot regulate themselves.

Another area where producers can have input and also gain information is through the Extension Service. As I am sure you have heard in previous hearings, Extension fulfills that role in many states, but not in all. Traditionally, the Extension Service has been a valuable resource for producers to learn about the latest technology and production practices. Extension has also been a source of objective views regarding the abundant, and sometimes contradictory information available to producers.

However, in some states the focus and priorities of Extension has shifted from these traditional roles, leaving producers to rely on other sources for information and assistance. This change may not be a significant problem in every state, but all of agriculture suffers when there is not a credible resource and voice for all producers at the local level.

I know the Federal Government cannot influence state and local dollars going into Extension, but we should be able to influence Federal dollars. The Extension Service should work in all states. We urge the Committee to direct that all Federal dollars spent on agriculture research be applied to production agriculture.

Mr. Chairman, there are other issues I know this Subcommittee will be looking at as you proceed to reauthorize the Research Title. In order to keep my comments within the time limit, I will stop here and submit a document that addresses several of those issues. With your permission, I would also like to submit comments from the National Cotton Council.

In closing, I would like to say that there is no doubt the U.S. agriculture research system is one of the best, if not the best, agriculture research system in the world. And, generally soybean producers are satisfied with the existing Federal system. We do not favor a complete revamping of the system, and we think any changes should be deliberate and targeted. We by no means want to change the system in states and regions where it already works. Instead, changes should be made to encourage the system to be responsive and helpful in all states and regions. We are committed to preserving a strong, viable Federal research system that will continue to educate, train, and employ the most qualified researchers, and that will maintain state-of-the-art research equipment, facilities and institutions, so the finest research will continue to be available for U.S. producers.

TESTIMONY OF TOM ANDERSON, BARNESVILLE, MN, WHEAT GROWER

Mr. Chairman and members of the subcommittee, my name is Tom Anderson, and I grow wheat, corn, and soybeans near Barnesville, Minnesota. I appreciate this opportunity to discuss federally-funded agricultural research, and how it may be delivered more efficiently in the new millennium.

It is interesting to note that as the reauthorization of agricultural research programs is being reviewed, several changes are being proposed. Among them is the idea of establishing research priorities through advisory committees whose membership would include farmers and business representatives. We do this in Minnesota through our Small Grains Research and Communications Committee, which has served in an advisory capacity to the State's wheat and barley production sector since 1992.

With a limited base of funds generated by our state's wheat check-off, we need to get the most out of any research that's funded, and leverage those dollars from other sources. That's why we formed a group representing producers, the media, state and Federal crop scientists, and the agri-business sector, to identify crop problems and industry challenges, and prioritize research projects.

Researchers submit progress reports, which we emphasize should be understandable to the layman, on projects funded partially or in full by the committee's recommendation. Research progress is communicated to the public. Crop scientists participate in a research reporting session held each November that is open to the public. I serve as the current chair of our Small Grains Research and Communications Committee, and as a producer, I feel this committee has been an efficient vehicle for not only prioritizing the money I invest in research, but also to talk more directly with the crop scientist about production questions I have that are not being answered, ideas that may help me grow wheat better, and what type of research I think is needed to help improve my crop business. I recommend that a similar advisory system be considered for federally-funded agricultural research.

More regional research and collaboration has also been suggested, with Federal agricultural research funding targeted to priority projects of multi-state or national relevance. The problem of scab and vomitoxin in wheat and barley fits these new parameters exactly.

Scab, or fusarium head blight, is a fungal disease that can severely reduce production and quality of wheat and barley, and create difficulties in marketing, exporting, processing or feeding. The disease can also cause stalk rot in corn. All U.S. wheat varieties now are vulnerable to scab.

The scab fungus can produce a toxic contaminant, deoxynivalenol (DON) or "vomitoxin." Humans and some animals can get sick from vomitoxin if consumed in concentrated amounts. Vomitoxin is a food safety concern which has caused large price discounts for farmers and grain handling problems. During the last harvest, it created marketing concerns at the Chicago Board of Trade, and the toxin is a research priority for the U.S. milling and malting industry.

In the 1990's, scab and vomitoxin have plagued bread wheats, barley, and durum in the Plains, and soft red winter wheat grown in states east of the Mississippi. Some trade estimates put total scab losses at the U.S. farm gate alone at over $3 billion in the last four years.

Lynn Daft with Promar International just completed a study on behalf of the National Association of Wheat Growers, to assess the economic impact of wheat diseases, primarily the three which have received the most headlines in recent years: Karnal bunt, TCK smut, and scab.

The study concluded that while significant losses result from all three diseases, the losses associated with scab are the largest by far, exceeding $1 billion in the year studied, and constitute a serious threat to the future of the wheat industry in areas vulnerable to the disease. The study further concluded that most of the losses from Karnal bunt and TCK smut resulted from regulatory actions rather than the diseases, suggesting that the ultimate solutions are dependent on policy changes, not production research.

The study warned that, if not controlled, diseases like scab can and probably will have major structural effects on the U.S. wheat industry, resulting in reduced output and a smaller share of the world market. The study also noted that consumers and users of wheat products have at least as much at stake from reducing or eliminating the costs associated with wheat diseases as do producers.

Crop scientists from states affected by scab and vomitoxin met last spring to coordinate research priorities. Federal funding aimed at scab and vomitoxin would enable researchers involving 12 land grant universities to study in a coordinated effort, food safety concerns and post-harvest management of infected grain, evaluate effective crop treatments, and most importantly, develop more resistant germplasm and crop breeding material.

Producer groups, the Millers National Federation, and some states are already funding research to address the scab problem. Now about 40 state and national groups representing farmers, grain millers, farm retailers, grain exporters and the U.S. seed trade have joined to recommend that more Federal dollars be allocated to research the scab problem. We advise a Federal investment of $5 million, which would be one-half of one percent of the $1 billion in economic losses from scab in 1993 alone.

It is unfortunate that this US wheat industry priority was insufficiently addressed during the FY98 appropriations process. However, authorizing legislation has been introduced by Representatives Debbie Stabenow and Roy Blunt, that would develop a partnership between a consortium of 12 land-grant universities and the Federal

Government to address the problem of scab in wheat and barley. We are hopeful that this legislation will gain congressional support.

If anything, the scab problem has brought different sectors of the U.S. wheat and barley industry together, to see that this disease gets remedied. Perhaps the scab and vomitoxin problem can be used as a template to build a better public research mechanism. A Federal investment to address a broad-based problem, with research components prioritized by an advisory committee consisting of public and private members and coordinated in an efficient manner through the land-grant university system.

Answer to Submitted Question from Mr. Combest to Mr. Anderson

The reason for the suggestion of an advisory board to oversee a 12-State, multi discipline project is to build in credibility and accountability as well as communication. The board would prioritize projects and assist with the reporting and dispensing of the research results.

In this day and age of computers, interactive television, conference calls, e-mail, et cetera, I think it is possible for boards to communicate and function to their charter at relatively low costs compared to years past when board members had to be in the same room to meet.

I would strongly be in favor of language to encourage cooperation among institutions in all multi-state research programs.

I would have a problem with language dropping the requirement for an advisory board with a project as large as the one that is outlined in my testimony. I am afraid that the stockholders wouldn't have enough input as to what is researched and reported.

STATEMENT OF GARY WEBER, EXECUTIVE DIRECTOR OF REGULATORY AFFAIRS FOR THE NATIONAL CATTLEMEN'S BEEF ASSOCIATION.

Today I am representing the position of the members of the Animal Agriculture Coalition. I appreciate the opportunity to testify before this subcommittee concerning the reauthorization of agriculture research, extension and education programs. Prior to my employment with the cattlemen I worked for the USDA Cooperative Extension System for over 10 years, including over 7 years as the National Program Leader for Animal Science. In addition, for nearly 4 years I was an area livestock specialist with Michigan State University.

The Scope of Animal Agriculture. Livestock and their products represent over 50 percent of farm and ranch income. They represent value added products which contribute to the vitality of rural communities. In fact, animal agriculture contributes directly more than $100 billion in farm and ranch cash receipts annually.

Livestock producers must meet the high expectations of the consumer for safe, wholesome and affordable food. At the same time, we must address the publics concerns regarding the impact of agricultural production systems on the environment and food safety while simultaneously maintaining profitability and be competitive in a global economy.

We support Federal Government investments in agricultural research and extension. Previous investments have produced a more than offsetting return to the taxpayer, in terms of low cost, safe and wholesome food, and increased business activity and resultant vitality of rural communities.

Status of the U.S. Food and Agriculture Research, Extension and Education System. Despite what you may hear, our research, extension and education system which serves agriculture is not broken. However, it is at risk. We can not allow the system to deteriorate. It is our collective responsibility to ensure this system, which is still the envy of the world, makes the necessary changes in order to remain viable into the 21st century and beyond. An Economic Research Service comprehensive literature review indicated there have been more that 64 reviews of the return on investment in agricultural research from 1915 through 1985. These 64 studies document a conservative average return of 46.7 percent . Agricultural research and education continues to be an excellent investment of public resources.

U.S. public sector research and development investments as a percentage of gross agricultural products (17 percent of our gross national product) is approximately 2 percent . Our global competitors, such as Australia and Canada each spend approximately 4 percent.

We are by no measure or means spending enough to support our research, extension and education system in the United States.

A System at Risk. In our view we must deal with 4 critical concerns, and find solutions. These include: (1) The research agenda is not focused on a coherent set of priorities. (2) The teaching curriculum is struggling to remain relevant to the changing needs of the agricultural sector. (3) The Extension System has blurred its agenda to accommodate the political demands of the urban/suburban votes while sacrificing its relevance to agriculture. (4) Federal funding for the agricultural research, extension and education system has become an exercise in afterthought.

These challenges must be addressed before the system loses critical mass resulting in dangerous lapses which will impact farmers, ranchers and indeed all consumers as well.

Recommended Solution: Rebuilding the Partnership. The strength of our agricultural research, extension and education system has been in the partnerships between Federal, state and local governments, farmers, ranchers, scientists, veterinarians and the general public.

Slowly but surely, the commitment to, and cultivation of, partnerships in the system has been diminished.

One symptom of the breakdown of the partnership has been the concerns about the relevance of research and accountability of the system.

You listened to our concerns and established the Research Extension and Education Advisory Board to improve the priority setting process of USDA and hopefully ensure relevance and accountability of the system.

In retrospect, we now realize what we need the REE Advisory Board to do is not to set the priorities for research, extension and education, but to play a role in reestablishing the partnership in the system. One means to this end is for them to manage a process of gaining input into the priority setting process by encouragement of and working with efforts such as FAIR 2002 and CROPS '99.

We also recommend the USDA reestablish the partnership through taking the following actions:

1. Publish all requests for proposals for competitive and special grants in the Federal Register for the purpose of notice and comment.
2. Publish in the Federal Register, for the purposes of notice and comment, the evaluation criteria for Government Performance and Review Act compliance as well as the plan of work criteria required before formula funds are distributed to the respective states.
3. Evaluate the potential role of a two tier project review process. Tier one would involve a joint review by scientists and producers making a first cut based upon relevance, and the second tier of evaluation oriented to ensure the best science is selected.

These requirements will improve the transparenc of the priority setting process and place a responsibility on the agriculture sector to provide input into the process, to be an active partner in the system.

Funding Structure. We believe maintaining a balanced portfolio Formula Funds, Competitive and Special Grants, and Intramural funding is appropriate. However, reauthorization of the research title should include the establishment of a contemporary description of the mission, roles, policy andpriority setting framework for each component of the system.

Relative to funding, we continue to be concerned about the tendency of Federal regulatory agencies to pursue authorization and appropriations to supporting their own research and education efforts. We support the current REE system as the primary research, extension and education arm of the USDA and that the REE programs should continue to meet the research needs of regulatory agencies.

A High-Priority, High-Payoff Research Agenda. The REE mission area should include a balanced portfolio of basic and applied research. There should be a significant investment in programs and projects of national scope. In particular there is a need to fund programs and projects which increase the rate of technology transfer to agriculture, the latter is an important responsibility of the extension system.

The FAIR 1995 process identified research goals and objectives that will further increase the competitiveness and sustainability of U.S. production from animals, including farm-raised aquaculture products. The research objectives link key societal issues to science and technology advances that can come about through basic and interdisciplinary research of food production systems. The goals are:

(1) enhance industry-wide responsiveness to consumer and societal concerns;

(2) meet market demands through increased efficiency, profitability and competitiveness;

(3) develop integrated food animal management systems;

(4) maintain and enhance environmental quality;

(5) improve food quality control in terms of safety, desirability, and nutritional composition and

(6) enhance animal well-being throughout the life cycle of foodproducing animals.

This research agenda, arrived at through consensus, will strengthen technological advances and technology transfer by government agencies, private industry, state universities, and agricultural experiment stations. The new knowledge that will be gained is expected to ensure that food and fiber products from animals will meet consumer needs and expectations and that the industry will remain globally competitive and sustainable.

Adopting this high-priority, high-payoff research agenda will benefit the American public. It will improve the safety and nutritional quality of food products from animals, while ensuring competitiveness of U.S. food production and responsible animal and environmental well-being. In concert, these advances will continue to enhance the quality of life for this and future generations.

Emerging Food Animal Issues. The most frustrating and recurring challenge our farmers and ranchers face is getting quick action and resolution for emerging food animal health issues. Tuberculosis, Porcine Reproductive and Respiratory Syndrome (PRRS), Johne's disease and TSE's such as Bovine Spongiform Encephalopathy and Scrapie are just five recent issues that have challenged our industries. Additional funding must be made available to the Agricultural Research Service (ARS) as they are called upon to address, emerging issues or needs of USDA's regulatory agencies. Additionally, universities, land-grants, and industry need a closer link with ARS to identify and resolve these emerging issues in a more timely fashion in order to limit their industry impact. Funding is also needed to prevent non-tariff trade barriers and to ensure that the U.S. remains competitive in the world market.

Integrated Production Demonstration Farms. Food animal producers strongly recommend utilizing integrated production demonstrations conducted in partnership with real world commercially viable farms and ranches. We encourage establishing partnerships with private commercial operations, with the Federal and state governments contributing matching funds necessary to establish and operate these demonstrations to validate the applicability of new technologies, methods and practices in real world settings. These projects would demonstrate that research and education can be integrated at the producer level to ensure food safety, improve profitability, protect public health, improve animal health and well-being, protect the environment, stimulate rural economies and expand U.S. exports of animal products.

In summary Mr. Chairman, we strongly recommend that Congress acts this year to reauthorize research, extension, and education programs. Food animal producers believe that the status quo is not acceptable and that meaningful change is needed. Our testimony has proposed specific policy recommendations that we hope the committee and the entire Congress fully consider. Working together, in a full partnership, we can meet these and other challenges. As a result, we will enhance U.S. agriculture's ability to continue to be the world leader in the production of safe, wholesome food and fiber, produced in an environmentally sound and profitable manner ensuring our ability to compete in the global marketplace.

TESTIMONY OF PERRY L. ADKISSON, CHANCELLOR EMERITUS,THE TEXAS A&M UNIVERSITY SYSTEM

Mr. Chairman, distinguished members of the Committee, my name is Perry L. Adkisson. I am Chancellor Emeritus of The Texas A&M University System. Prior to being Chancellor, I served several years as Deputy Chancellor for Agriculture and was in charge of the agricultural research, teaching and extension activities of the System. Prior to that, I was Head of the Department of Entomology for 11 years and for almost 40 years a research scientist involved in crop protection. In addition, I served two terms, 11 years, as a member of the National Science Board which oversees the activities of the National Science Foundation which funds much of the basic research conducted by the Nation's universities. Thus, I have wide experience in the conduct and supervision of research and believe I can bring to this committee a perspective that might be of use to you in reauthorizing agricultural research. In my testimony today, I want to stress the need and importance of increasing support of agricultural research by formula and special grant funding.

Although there has been a substantial increase in funding in recent years for the National Research Initiative (NRI) of the U.S. Department of Agriculture, there has been an overall decline in state and Federal funding for production-oriented research. The National Research Initiative is an excellent program which I support, but it does not meet all the research needs of our food and fiber production system. The NRI is a competitive grants program which supports the basic biological sciences, especially biotechnology, important to agriculture. The program is administered in a manner very similar to the National Science Foundation where small grants, typically of $100,000 to $200,000 per year, are made to single investigators for periods of two to three years. These grants are great for building small blocks of knowledge which may later be used to advance a specific field. They are not designed to solve problems of immediate practical importance to the agricultural production system. For the latter purpose, formula funding and special grants are needed.

Because of the decline in funding many talented production-oriented agricultural scientists, e.g. plant and animal breeders, plant protection specialists, agronomists, animal scientists, agricultural engineers, etc. are under-funded and under employed. You can not deal with a sudden and unexpected pest or disease outbreak or develop better crop varieties, food animals or superior trees with a three year grant that might be renewed. These types of programs require continuous and stable funding for long periods of time, such as provided by formula funds.

Also, funds are practically nonexistent for large regional and national problems that can best be solved by a multi-university, multi-disciplinary approach. Problems of this kind may be highly complex and can best be solved by assembling a large number of scientists of various disciplines in a highly focused, centrally managed effort requiring millions of dollars per year. The competitive grants program does not meet these needs, nor should it. This need can best be met by the special grant program where you can choose the best institutions and scientists to be involved in the research.

I want to use two examples to illustrate the need for special grants that are not being met by other funding sources. The first involves the need for reducing pesticide use on fruits and vegetables and the second presents the possibility of greatly reducing the risks of diet-related diseases.

Great concern has recently been expressed about the need for reducing levels of pesticide residues on fruits and vegetables, and especially those consumed by infants and children. I believe it is possible to develop technology over the next 10 years which could reduce pesticide use on these crops by 50% or more. This could be accomplished by assembling a multi-disciplinary team in the state agricultural experiment stations in 7 or 8 of our largest fruit and vegetable producing states. The scientists would have to be chosen on the basis of their expertise and managed in a highly focused manner with well defined goals and objectives and a budget of $8 to $10 million per year. The best, and perhaps, the only way this research could be funded is by a special grant.

The second example involves an exciting new possibility of reducing the risks of certain diet-related diseases. This could have enormous benefit to society and individual consumers. Five diet-related diseases—certain types of cancer, coronary heart disease, stroke, atherosclerotic diseases, and diabetes—are the leading causes of death in the United States. These five diseases are responsible for approximately two-thirds of the more than 2.0 million deaths that occur in the U.S. each year. Since these diseases are diet-related it should be possible to prevent them, delay their onset or lessen their severity through dietary changes. Several medical researchers are developing a growing body of scientific knowledge that many food plants contain chemical compounds that can inhibit tumor formation, reduce the risk of heart attack and slow atherosclerosis. For example, there are compounds in cauliflower and broccoli that can aid in the prevention of prostate cancer and in garlic and onions that can inhibit tumor formation in the esophagus, colon and rectum. There are compounds in many other vegetables, fruits and soybeans that are active in prevention of certain cancers, coronary heart disease, and atherosclerosis.

It is surprising that with so much data becoming available on the identify of naturally-occurring compounds in food plants that may aid in the prevention of these most serious diseases, there has been very little research to enhance these characteristics by modern plant breeding and molecular genetic methods. What we need to do is to link the premier medical research centers working on this problem with a team of top vegetable and fruit breeders and molecular geneticists to identify the most effective compounds for disease-prevention in specific food plants, and the levels required for maximum prevention. The agricultural scientists can then use this knowledge to design food plants meeting these specifications. This is a large, complex problem and will require teams of scientists, several years of effort and millions of dollars. A project of this complexity and expense can only be done with a special grant.

These are the kinds of research projects that we need to be doing but are not as there is no place to go for funding except to Congress. I would hope that Congress, in its wisdom, will continue and will increase formula and special grant funding. I realize there are critics, mostly outside the agricultural community, who have cast a blanket indictment on this type of funding as "pork-barrel" and for projects which have not been peer-reviewed. However, these critics do not understand all the needs of agricultural research as well as you do. Most of the criticism can be met with valid arguments if the critics want to listen. All research projects, including those conducted with special grant or formula funding can be peer reviewed. With regard to the "pork-barrel", please remember that there are many worthy agricultural research needs that do fit the competitive grants mode and there are many large projects that can only be funded by Congressional appropriations. So I would urge you in your deliberations to consider the needs of all agriculture and to increase special grant and formula funding for the applied research needs of our food and fiber production system.

STATEMENT PRESENTED BY PAUL GILMAN, PH.D., EXECUTIVE DIRECTOR, BOARD ON AGRICULTURE, NATIONAL RESEARCH COUNCIL

Chairman Combest and Members of the Committee: I am Bruce Alberts, president of the National Academy of Sciences. In this capacity, I also serve as chairman of the National Research Council (NRC), the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine.

First, let me briefly describe what the NRC is and how we work. I do this because it is important for your understanding of the value of our recommendations. The Academy was chartered by Congress and signed into law by Abraham Lincoln. It differs from most other Academies of Science in the world in that it is not just an honorific Academy. From the outset it was established to be an independent voice on matters of science and technology. It does so through the NRC, using thousands of experts from academia, industry, and other organizations who volunteer their time. During any given year more than 6,000 scientists, engineers, and other experts participate in our activities—most of them at the request of the Federal Government. We actively strive for a balance of views among these individuals and subject them to a conflict of interest review. Our normal product is an independent consensus report. From initial approval of a study to this final report, every project is subject to oversight by supervisory boards and commissions within the NRC whose members are again, volunteer experts - often members of the Academies. The final step in our rigorous quality control process is a review by outside anonymous reviewers who did not serve on the study committee. The sponsoring Federal agencies have no role in the process and do not see a report until it is ready for public release.

I am pleased to testify before you today on the importance of agricultural research, extension, and education programs that must be reauthorized by Congress in 1997. I am going to talk to you today about the even greater importance of these programs given the fact that last year the Congress passed and the President signed into law the most sweeping changes in agricultural policy since the 1930's. The 1996 farm bill and its "Freedom to Farm" provisions position the U.S. food and agricultural sector to capture the growth in world markets. In the future, the ability of this industry to capitalize on trade opportunities will depend less on subsidization by the government and more on gains in efficiency and productivity—which can only be achieved if this country has a strong agricultural research base.

To be competitive in this new era requires major breakthroughs in science and this mandates a strong public research base to provide the fundamental science underlying these advances. Given the long lead time necessary from basic research to development of a new technology (about 7–10 years) that effort must begin now. As I know you are aware Mr. Chairman, the NRC in its previous reports on agricultural research has strongly recommended the need for a competitive grants program. Today I am reaffirming that recommendation in my testimony. This concept has been adopted by USDA and codified by Congress in the 1990 farm bill as the National Research Initiative (NRI). However, funding for the NRI has fallen drastically short of the $500 million annually envisioned for this program and authorized by Congress. Without aggressive expansion in funding, a significant portion of the benefit of new science and technology will go unrealized and so in turn will the promise of a competitive agricultural industry envisioned in the 1996 farm bill.

Beyond fully funding this fundamental program, is the importance of ensuring the conduct and quality of agricultural education and research, and thus the land grant system. Land grant colleges of agriculture (LGCAs), initiated by the Morrill Act in 1862, historically have been entrusted with these functions and supported by public funds to carry them out. However, many questions have been raised by this committee and others as to whether LGCAs have positioned themselves to meet the challenges of the 21st century.

The NRC, under guidance provided by its Board on Agriculture, undertook a study of the land grant system because of two main observations. First, the client base for food and agricultural research and education has changed dramatically as the Nation's economy has developed and its population has shifted to cities and suburbs, and the policy issues have shifted accordingly. Second, the land grant system is defined not only by its distinctive heritage but also by a set of institutional arrangements unique within higher education in the United States. These arrangements have changed little since the system's early years despite major changes in the food and agricultural system. The institutional arrangements include

A federally legislated mandate to embrace a three-part mission of making education accessible to students of ordinary means, conducting scientific research to underpin teaching programs, and extending research findings to off-campus users to ensure that science serves people. A Federal-state partnership that produced at least one land grant college in every state and territory. A Federal funding mechanism that distributes research funds and extension funds to LGCAs based on the state or territory's share of total farm and rural population, and a network of separate—but not equally well supported-historically black land grant colleges.

In addition to changes in agriculture and its role in society and the economy, new developments in science and science policy and the Federal funding environment motivated the NRC study of and recommendations for land grant universities. The study was sponsored by funds provided to the NRC mainly from the W.K. Kellogg Foundation and to a lesser extent by the U.S. Department of Agriculture.

The NRC Committee Process. NRC studies are conducted by volunteers with relevant experience and expertise. Twenty-one individuals were convened under the oversight of the Board on Agriculture. These people were balanced for age, gender, and ethnicity; geographic location; and disciplinary expertise. They were participants in the land grant system—administrators and faculty with teaching, research, and extension expertise—as well as representatives of public interest groups, state government, agribusiness, and the nonagricultural science community (list attached).

The study was divided into three stages. First, information was collected, reviewed, and assessed on the LGCAs and their operating environment, and expert opinions were solicited from observers of and participants in the land grant system. The NRC published this historical review and collection of public data in Colleges of Agriculture at the Land Grant Universities: A Profile.

During the second stage of the study public forums were held at land grant colleges. The forums were important means to garner public input on the relationship between college activities and public needs and priorities. In the third phase, information was synthesized and integrated from the first two phases and a consensus report Colleges of Agriculture at Land Grant Universities: Public Service and Public Policy was published by the NRC last year.

Conclusions and Selected Recommendations. The consensus report concluded that a national science and education infrastructure that underpins continued advances in the food and agricultural system, and Federal support of that system, remain squarely in the national interest. It also concluded that although the land grant system has served the Nation well, there is need for change in four principle areas:

The LGCA system must increase its relevance to contemporary food and agricultural system issues and concerns. It must also continue to develop programs that include a wider array of students, faculty, and clientele of diverse backgrounds and perspectives.

The system must organize its programs and projects more efficiently and more in keeping with regional and multistate requirements of many modern food and agricultural system problems. There is a need for a "new geography" for the land grant system.

The system must reinvigorate its commitment to the linkages among teaching, research, and extension in order to fulfill its mandate of conducting science in service of society. The system must enhance its accountability to the public and its reputation for quality in the science community.

Twenty recommendations were developed in support of these key themes and are attached as a supplement to this statement. Several address the teaching, research, or extension components individually, and other recommendations cut across these components. A significant number recommend refinements in Federal policy as a means of reorienting incentives and signals in the LGCA system. Several of these recommend changes in Federal policy are especially pertinent to this hearings and they will be discussed here.

Involving the Stakeholders. LGCAs have a responsibility, based on their philosophical roots and legislative mandate, to be relevant and accessible to the general public and particularly to citizens of ordinary means. However, many of today's food and agricultural system beneficiaries, such as urban and suburban residents and environmentalists, have little knowledge of or connection to many of the LGCAs. Enhancing these connections does not mean abandoning farmers. It means building a broad constituency for programs that respond to and enhance complementarity among the Nation's multiple goals for its food and agricultural system. Enhancing connections to both farm and nonfarm residents is an outcome crucial to extending the colleges' relevance into the 21st century.

In order to enhance these connections, the report's first recommendation is that in setting program priorities that guide resource allocation, LGCAs should garner effective input from a wide variety of stakeholders. In fact, receipt of USDA-administered funds—including those allocated by formula, special grants, and competitive grants—should be contingent on the demonstration of such input.

Creating a New Geography. Seventy-six institutions in 50 states, six territories, and the District of Columbia comprise the 1862 land grants and the historically Black or 1890 land grants. If the land grant system is to adopt a research and education agenda that responds to the priorities of consumers and the many specialized needs of diverse producer groups, then it must realize organizational efficiencies by reducing duplication and strengthening multistate and multi-institutional partnerships that build upon the specializations of individual institutions.

In addition, the nature of contemporary food and agricultural system issues calls for regional or multi-institutional efforts. Many natural resource and environmental issues, such as watershed management, cross state lines. Many consumer issues such as nutrition and disease, know no political boundaries. In fact, they may be endemic to similar populations located in spatially separated parts of the country. Even within the farm sector, production issues are often pertinent to producers in a region made up of all or parts of several states. In recognition of the importance of regional or other multi-state and multi-institutional approaches coupled with the need for Federal funds to provide incentives for such partnerships, the report recommends that significant shares (25 percent or more) of USDA-administered funds for teaching, research, and extension should be used to provide incentives for regional centers, consortia, programs, and projects that effectively integrate and mobilize multi-state and multi-institutional resources.

Integrating Teaching, Research, and Extension. LGCA administrations, faculty appointments, budgets, and Federal land grant legislation are structured along the lines of teaching, research, and extension. Although it is the historical commitment to its three-part mission that has distinguished the LGCAs, the separate administrative and funding structures too often hinder integration of the three functions and their programs. The different statuses implicitly, if not explicitly, assigned to each function by the university community contributes to the separateness.

The integration of teaching, research, and extension is valued for several reasons. Research-extension linkages, when they work well, spawn a two-way flow of insights and information that enhances the relevancy of research and uses research findings where they are most valuable to the public. Strong research-extension linkages help ensure that outreach programs reflect the most up-to-date scientific knowledge. The integration of teaching, research, and extension is of special value to students because it offers an academic experience that involves the students in both the process of scientific discovery and public service. To put a renewed emphasis on an integrated tripartite mission, the report recommends that Federal formula funds for research and extension be combined into a single allocation. Further, 50 percent of the combined funds should be used to support programs, projects, and activities that explicitly integrate teaching, research, and extension or alternatively, the work of multiple disciplines.

Enhancing Accountability to the Public. It is widely recognized that USDA-administered research funding differs from other R&D funding in the much smaller percentage allocated to individuals and projects on the basis of merit and competition. This difference is because of (1) the relatively large share of agricultural research conducted intramurally by USDA, and (2) the use of formula funds and Congressionally designated grants in allocating extramural funds to institutions. Arguments can be made for and against both formula-based funding and competitive grants. However, some of the early reasons for formula funding of state experiment stations, such as the need to draw each state into agricultural research and the site-specific nature of agricultural research, carry less weight today. Today most states provide far more financial support than is required to match Federal dollars; and many types of food and agricultural research, such as nutrition, food safety, biotechnology, have little or no location specificity. Other arguments for formula funds, such as support they provide for structural linkages between research and extension that respond to local, state, and regional needs and for certain applied research projects that require long-term continuity, remain quite compelling.

Despite its uniqueness, agricultural research needs to enhance quality, accountability, and equity through greater use of competitive grants. The report reaffirms previous NRC reports and as I stated at the beginning of my testimony, recommends that the Federal partner should increase its use of competitive grants to fund projects and individuals on the basis of merit as determined by peer review. Greater use of competitive grants in relation to formula funding and Congressional earmarks will enhance quality and accountability, and lessen the perception that experiment station researchers are insulated from competition with the rest of the research community.

The Federal Government should increase competitive funding of food and agriculture projects. The funding level for competitive grants should be no less than the $500 million authorized by Congress for the National Research Initiative in Agriculture, Food, and the Environment. Recognizing fiscal constraints, options for increasing the share of Federal support for competitively awarded peer-reviewed research include (1) directing funds to research from other USDA budget categories, particularly as a means of reinvesting savings on agricultural subsidies; (2) transferring to competitive grants programs a portion of the funds distributed to experiment stations by formula and special grants; and (3) drawing on USDA intramural noncompetitive research funding. A two tier review similar to that of NIH should be used at the Federal level to guarantee that public benefits as well as scientific merit guide the selection of research proposals. To those who would criticize a reallocation of funds from formula and intramural funding, it needs to be pointed out that the scientists affected by such a reallocation can apply to the NRI for funding since all scientists are eligible for these funds.

Nonetheless, a continued role exists for formula funding, particularly in supporting linked teaching, research, and extension. The report recommends, however, that new formulas be designed and implemented by which food and agricultural research and extension funds are allocated within the land grant system. The current formulas are outdated in relation to modern food and agricultural constituencies. These formulas were generated in an era when a much higher percentage of the Nation's population was rural and farm based, and the Nation's agricultural interests were dominated by concerns with domestic crop production and food security. Today, many issues of concern to the U.S. public, such as diet and health, families and youth at risk , and food safety are not specific to farm production regions, suggesting the need to rethink formulas for both research and extension. In revising the formulas, consideration should be given to variables such as states' proportionate contributions to total population, relative poverty rates, or shares of cash receipts from farm and food marketings—as appropriate reflections of the LGCA system's broadened contemporary customer base.

Federal legislation requires that state governments match Federal formula-based contributions to research conducted at experiment stations located at 1862 institutions and as noted earlier, states contribute far more than their matching requirements. However, no such requirement applies to Federal contributions to research based at the 1890 institutions. Aside from the obvious inequity among institutions within the land grant system, this discrepancy in Federal funding requirements also means that the clientele of the 1890 institutions are less likely to receive adequate research and education attention. The 1890's have been uniquely focused on issues, problems, and needs of African Americans and other ethnic minority groups, small-scale and limited resource farmers, and low-income rural and urban families. Thus, the report recommends that the Federal Government require that states match Federal formula funds going to the historically Black 1890 institutions in the same manner as is required for the 1862 institutions. This recommendation is meant to enhance the vital role of the 1890's as providers of access to research and education to under represented segments of our society.

Looking to the Future. The land-grant system has served the Nation well, but changes are needed that reflect modern realities, challenges, and opportunities. The system must increase its relevance to contemporary food and agricultural system issues and concerns; reinvigorate its commitment to teaching, research, and public service; organize its programs and projects more efficiently and more in keeping with regional and multistate requirements of many food and agriculture system problems; and enhance its accountability to the public.

Their historical commitment to public service distinguishes the LGCAs. The tripartite tradition of teaching, research, and extension at land grant colleges is a unique institutional base on which to erect the structure of knowledge that can assure a competitively, socially, and ecologically sustainable food and agricultural system. It is that unique base of support adapted for the challenges of the 21st century that will continue to make this segment of our Nation's research system as vital and important as its historical past.

An Agricultural Genome Project. Aside from the important questions about land grant colleges of agriculture you will also be considering USDA's authorization request for a Food or Agriculture Genome Project. This is an extremely important project. Over the last decade we have made a major investment in genomic activities of importance to agriculture. Thus far, the approach taken has not set priorities among the major commodities of interest to agriculture. Questions have been raised as to whether that is the best approach. Last year USDA along with the National

Science Foundation (NSF) and the Department of Energy (DOE) jointly funded the Arabidopsis genomic program. As a model plant with an unusually small genome, Arabidopsis has become the plant world's equivalent to the laboratory mouse, and it is now poised to become the first plant to have its entire genome sequenced and made available for study. Like work with the mouse, the ultimate value of research on Arabadopsis lies in what it teaches scientists about many other, more important species.

The question now is where do we go from here. This past April, USDA requested the NRC to provide a forum for discussing the opportunities and issues that would arise if a coordinated agricultural genome program were begun. Scientists from industry, academe, and Federal agencies shared their experiences in mapping and sequencing programs in diverse areas of genomics including human, mouse, Arabidopsis, livestock, and maize. Many of the scientific experts agreed that a coordinated effort at mapping and sequencing the genomes of important food, fiber, and associated microbial organisms could be more cost effective and timely than the current piecemeal approach. Forum participants identified numerous scientific and programmatic issues that should be considered by USDA before launching a full scale genomic research program. Many participants also seemed to believe that the project should be planned in greater detail before major amounts of money are spent on it, since timing and coordination among the different components will be a key factor in its effectiveness.

Similar types of issues and concerns were raised in 1987 with regard to a Human Genome Project. I was privileged to chair a NRC committee at that time that was assigned the task of examining the desirability and feasibility of mapping and sequencing the human genome and suggesting options for implementing a possible project. The resulting report called Mapping and Sequencing the Human Genome (NRC, 1988) provided the foundation for the implementation plans that were subsequently developed by NIH and DOE—the two agencies Congress designated to jointly work on the human genome project.

Before USDA, NSF, DOE and other potential agencies commit to the details of an agricultural genome project, I strongly urge you to consider the preparation of an implementation plan—such as the one we prepared for the human genome project. It is even more important that such a plan be developed for agriculture because it is more complex and will involve more agencies. For example, in choosing target species to map and sequence, is genome size as important a criterion as agricultural importance? How can we most effectively exploit our knowledge of the DNA sequence of one species to determine that of another species using comparative mapping? What are our special needs in bioinformatics? What is the role of the public and private sectors in mapping agricultural genomes? Should we collaborate with international partners to share costs? If so, how should we do it?

The importance of mapping agricultural genomes cannot be overstated and there is a great deal of enthusiasm for this initiative. But we need to plan before spending major resources. It is therefore imperative that a blueprint be prepared that provides a detailed strategy for such a large undertaking, harnessing the very best wisdom of the scientific community.

Attachments for the Statement of Bruce Alberts, Ph.D., President, National Academy of Sciences, Chairman, National Research Council

Recommendations of the National Research Council Report EntitledLand Grant Colleges of Agriculture: Public Policy and Public Service

RECOMMENDATION 1. Receipt by LGCAs of USDA-administered research and extension funds—including formula funds and competitive grants—should be contingent on their ability to demonstrate that a wide variety of stakeholders have effective input into a systematic prioritization (no less often than biennially) of research, extension, and joint research-extension issues, that specifies areas of increased and decreased emphasis. Further, LGCAs must demonstrate that a wide variety of stakeholders are consulted in resource allocation decision making processes.

RECOMMENDATION 2. In light of the changing structure of agriculture and the importance of diverse participants in production agriculture, the LGCA system should critically assess the needs of all producer population groups, develop priorities and targeted programs for each, and adjust technology transfer and information delivery modes appropriately.

RECOMMENDATION 3. Federal programs and policies should enhance the LGCA system's efforts to realize organizational efficiencies and synergies that broaden and deepen the system's expertise and expand access and relevancy. Significant shares (25 percent or more) of total current USDA-administered extramural funds—including formula funds and competitive grants—for food and agricultural research, teaching, and extension should provide incentives for regional centers, consortia, programs and projects that effectively integrate and mobilize multi-state and multi-institutional (including 1862, 1890, and 1994 colleges') resources; and distance learning and other technologies that expand access, broaden clientele, and enhance multi-institution collaboration in teaching, research, and extension.

RECOMMENDATION 4. The LGCA system and the Federal Government must revitalize the linkages among teaching, research, and extension. To further this goal, the committee recommends the following Federal formula funding for research and extension should be combined into a single allocation to LGCAs for food and agricultural system research and extension, requiring that the use of these combined funds reflect a coordinated effort to link university research and extension in the national interest. (It should be strongly underscored that the intent of this recommendation is not to reduce the importance or destroy the integrity of one function or the other but to encourage their integration.) It should be required that one-half of the formula funds for research and extension at each institution be directed to fund programs, projects, and activities that integrate teaching, research, and extension, with a special emphasis on inter- and multidisciplinary programs and projects, and the engagement of students on research teams and in extension programs as interns and aides.

RECOMMENDATION 5. Regular and critical evaluations of federally funded research and extension programs should assess the congruence between such programs to which Federal funds are devoted and the provision or enhancement of public goods of regional and national significance.

RECOMMENDATION 6. The bridging programs among 1862s, 1890's, and 1994s deserve special emphasis from Federal funding programs, such as Federal challenge grants, including evaluation of their effectiveness as models for expanding access and diversity in the food and agricultural sciences. The Federal Government should also become an active promoter of the use of articulation agreements among institutions within and across states to facilitate student exchanges and transfers, and encourage collaborative internship programs among institutions in the LGCA system.

RECOMMENDATION 7. The colleges of agriculture should require students to take at least one internship from a wide range of creative, mentored internship opportunities representing the diverse career settings for which graduates in food and agricultural sciences are prepared.

RECOMMENDATION 8. The Federal Government should expand competitive challenge grants to creative teachers and teaching teams to develop innovative multidisciplinary and systems-based course material and curricula.

RECOMMENDATION 9. The Federal Government should increase competitive funding of food and agricultural research projects. The funding level for competitive grants should be no less than the $500 million authorized by Congress for the National Initiative for Research in Agriculture, Food, and the Environment (NRI). Additionally, the share of total Federal research support awarded competitively to projects and individuals (including teams) on the basis of peer-reviewed merit should be increased. Recognizing fiscal constraints, options for increasing the share include (a) directing funds to research from other USDA budget categories, particularly as a means of reinvesting savings on agricultural subsidies; (b) transferring to competitive grants programs a portion of the funds currently distributed to experiment stations by formula and special grants; and (c) drawing on USDA intramural noncompetitive research funding. Consistent with Recommendation 1, a two-tier review system similar to that of NIH, should be used at the Federal level to guarantee that public benefits as well as scientific merit guide the selection of research proposals.

RECOMMENDATION 10. USDA should continue its role in enhancing participation and success in competitive grant programs by all institutions in order to build human capital nationwide in food and agricultural research. For example, it should (a) continue to designate 10 percent of the enlarged competitive grants pool for institutions in USDA-EPSCoR states; (b) allocate 5 percent of competitive grants for 1890 institutions, while maintaining capacity building grants; and (c) streamline the Federal competitive grants application process without sacrificing accountability or the adequacy of information on which to judge scientific merit.

RECOMMENDATION 11. A new formula by which food and agricultural research funds are allocated within the land grant system should be designed and implemented to accurately reflect the full range of food and agricultural research beneficiaries.

RECOMMENDATION 12. The Federal Government should require that states match formula research funds going to 1890 institutions in the same manner as is required for 1862 institutions.

RECOMMENDATION 13. Data on extension projects and programs, goals, and outcomes should be compiled and organized more systematically to enhance their usefulness to extension administrators and clientele and to aid in analyses of the returns on public investments in farm and nonfarm extension programs.

RECOMMENDATION 14. The Federal Government should require that states match formula extension funds going to 1890 institutions in the same manner as required for 1862s.

RECOMMENDATION 15. Extension programs must be underpinned by an academic research base in the land grant university. Consequently, the committee strongly encourages land grant universities to embrace the mandate of outreach and extension and to ensure that the entire university is accessible and responsive as the research base for farm and nonfarm extension programs. To accomplish this, administrative structures, incentives, and reward recognition must be generated within the university to promote the commitment and involvement of faculty, staff, and administrators across the university to actively participate in outreach, extension, and public service.

RECOMMENDATION 16. Federal agencies (operating under the auspices of a Cabinet-level task force) should identify appropriate opportunities to link programs at the Health and Human Services, Commerce, and other departments to USDA-based extension, especially in the delivery of services to nonfarm clientele.

RECOMMENDATION 17. The research base for extension's nonfarm programs, such as community and economic development, human development, and public policy, should be enhanced by strengthening the land grant universities' applied research capacity in economics, sociology, public health, and related disciplines and their applications to extension programs.

RECOMMENDATION 18. New and innovative approaches to augment extension financing should be pursued, as appropriate, taking into account implications for access to extension by limited-resource farmers and other limited-resource clientele groups.

RECOMMENDATION 19. A new formula by which base food and agricultural extension funds are allocated within the land grant system should be designed and implemented to accurately reflect the full range of food and agricultural extension service beneficiaries.

RECOMMENDATION 20. All national extension initiatives should be available on a competitive basis to land grant and nonland grant institutions. Consistent with the committee's prior recommendations (Recommendations 3, 4, 15, and 17), these competitive grants should provide incentives for multistate, multi-institution, or regional extension programs; new and innovative approaches to the delivery of extension services, particularly where access can be expanded significantly and benefits shared across political boundaries; programs that significantly improve the science base for extension programs, such as those dealing with human nutrition education and social science issues; and programs that enhance the public service component of academic programs.

STATEMENT OF KENNETH A. ROSE, VICE PRESIDENT FOR RESEARCH AND EDUCATION, NATIONAL GRAIN SORGHUM PRODUCERS

Mr. Chairman, Members of the Committee, my name is Ken Rose. I raise wheat and sorghum, as well as manage a commercial cow/calf operation on my farm near Keyes, Oklahoma and serve as vice president for research and education for the National Grain Sorghum Producers. I am pleased to appear before this Committee on behalf of the National Association of Wheat Growers, National Barley Growers Association, National Corn Growers Association and the National Grain Sorghum Producers. I would like to offer the following observations and suggestions concerning reauthorization of the research title to the 1996 farm bill.

Background. For over 100 hundred years, the U.S. system of agriculture research, education and extension has provided the foundation upon which the United States has built the world's most productive and efficient agricultural system. This system has benefited not only agricultural producers, processors, merchandisers, input suppliers, grain handlers and others involved in production agriculture, but also the consuming public both domestically and abroad. The return on public investment in agriculture research has been conservatively estimated to exceed 35 percent annually. When one considers the reduction in human suffering, ability to transfer human and capital resources from food production to other enterprises, and the improved standard of living we all enjoy, it is readily apparent that the true return to research is significantly underestimated.

Given these benefits, one can conclude that the level of investment should be increased. Unfortunately, current budget reality suggests that the significant increase in Federal investment in agriculture research which the rate of return would justify is unlikely. Maintaining the current level of support in terms of dollars adjusted for inflation spent on research projects and human development directly applicable to enhancing agriculture productivity, improving food quality and safety, ensuring international competitiveness and satisfying other consumer needs is a more difficult hurdle with each passing year. In addition, while we recognize the past accomplishments of the system and enjoy the benefits it has provided, simply maintaining the status quo is unlikely to provide the new technology, products and human capacity required by production agriculture and consumers in the future.

We fear that simple reauthorization of the status quo will require an ever increasing amount of the static funding base to be allocated to maintenance of current physical and human capacity without examining whether the existing system is in fact appropriate and capable of addressing future problems and capitalizing on new opportunities. Reduced government intervention in agriculture production, lagging productivity growth, privatization and globalization of markets, and increased concern over issues such as bio-technology, food safety and environmental enhancement are real challenges which must be met. Through the reauthorization process, Congress has the opportunity to review the individual system components, examine innovative ways to improve efficiency and make adjustments which will ensure system relevance and productivity as we enter the next century.

We believe five areas should be addressed through the reauthorization process: 1. Funding mechanisms and allocation. 2. Institutional collaboration and cooperation. 3. Industry input in determining research relevancy and priorities. 4. System accountability. 5. Future opportunities.

It is our view that creating a Funding Review Task Force, establishing additional funding guidelines, redesigning the operation and responsibility of the National Agriculture Research, Education, Extension and Economics Advisory Board (NAREEEAB) and modifying the Fund for Rural America can serve as the means to address the five issues in a proactive fashion.

Funding mechanisms and allocation. Federal funding of agricultural research contains a mix of formula funds, competitive and special grants and intramural funding. Each of these funding components provides support for the maintenance and development of institutional, physical and human research capacity in both basic and applied agriculture research. Additionally, these funds are utilized to leverage additional research investment from states and private sources. While we support maintaining a mixture of funding sources, we believe it is appropriate to review the current allocation of these resources. The Facilities Review Task Force has recently begun its work in analyzing the current state of the physical agriculture research infrastructure, and will make recommendations to the Congress concerning the Federal role in providing research facilities. We believe it is appropriate during this period to engage in a review of Federal research funding mechanisms as a parallel activity to that of the Facilities Review Task Force. The Funding Review Task Force should be charged with: (1) Comparing the adequacy and efficiency of existing funding components. (2) Providing an analysis of funding levels, requirements and needs of each REE mission responsibility, including intramural research. (3) Reporting on opportunities to obtain non-REE Federal funds from other USDA and Federal agencies and departments, state agencies and the private sector. (4) Developing recommendations for proposed changes in existing funding arrangements including capital expenditures.

A majority of the task force should consist of representatives of production agriculture (input supply, farm production, handling, processing and marketing), and the remainder from other interested sectors. All voting members should be appointed by the House and Senate Agriculture Committees, and should represent both sectoral and geographically diverse interests. The Secretary of Agriculture should appoint 5 non-voting, ex-officio members, one each to represent REE, ARS, CSREES, ERS, NASS. The task force should be expected to report on its findings within 18 months of its formation.

In addition to an overall review of existing funding mechanisms and allocation procedures, we believe that USDA must have flexibility to react quickly and decisively to emergency situations. While the Secretary has existing authority to shift funds from one agency to another in health emergencies, he needs additional authority to allow the research, extension and education services to focus on specific emergencies which are deemed to severely impact production or markets. Furthermore, the Secretary should be able to provide longer term commitments to addressing those situations once the imminent threat has been resolved. In order to ensure the funds are actually spent on emergency situations, we support providing the National Agriculture Research, Education, Extension and Economics Advisory Board with authority to approve expenditures for emergency projects that will last more than one year.

Institutional Collaboration and Cooperation.

Federal funding of research and extension programs should be utilized to ensure that our research institutions seek opportunities to coordinate and collaborate with others in both the public and private sectors. Federal research expenditures should be limited to projects that address national or multi-state priorities, and topics where the incentive for other investment is low compared to the expected benefits which might accrue to production agriculture or consumers. By so doing, we will be recognizing the need to increase system efficiency and specialization, reduce unnecessary duplication and the fact that many of the issues which need to be addressed have little location specificity. Improving the Current Research Information System (CRIS) and full utilization of computer technology to exchange information should enhance opportunities to improve the level of cooperation among various research entities.

Funding limitations from all sources and broadened responsibilities have weakened the ability of extension to fulfill its historic mission and adequately address the many new challenges which confront producers and other agriculture participants. We believe that Federal support of extension activities should be dedicated to issues of economic importance to production agriculture which includes the many sectors engaged in the production, processing and merchandising of food and fiber products.

Congress should also consider combining a significant portion of research and extension funding into a single allocation to encourage full mission and priority integration of the two disciplines. This action will also improve the timely dissemination of information and establish outreach programs that reflect the current state of scientific knowledge.

NAREEEAB (Board). The National Agricultural Research, Extension, Education, and Economics Advisory Board was established in the 1996 farm bill to replace numerous existing advisory groups with a single committee for the purpose of reviewing USDA/REE planning objectives and providing recommendations to that Federal research agency and the land grant universities. The Board consists of 30 members, representing a wide range of industries, organizations and institutions that have some level of interest in agricultural research, education and extension programs, and 5 ex-officio members who represent USDA. All members are appointed by the Secretary of Agriculture.

The formal structure of the Board ensures that a significant number of members come from the system the Board was established to advise, and the overall size makes it difficult for the Board to operate efficiently in a quasi-independent advisory capacity.

We believe the system's primary stakeholders (input suppliers, producers, handlers, processors, and merchandisers) should be in the position to drive the process. The Board should then take the lead in accepting input to establish research, education and extension priorities, define a process to ensure the relevancy of research proposals and develop a methodology utilizing a financial and performance audit, consistent with the Government Performance and Results Act (GPRA), to review research expenditures in relation to the output of the system.

We recommend that the Board be modified as follows to ensure that it is able to effectively undertake both its current responsibilities as well as those defined above.

Proposed modifications to the National Agricultural Research, Extension, Education and Economics Advisory Board

Membership. The Board shall consist of 18 members, appointed as follows: Six members shall be appointed by the Secretary of Agriculture; Six members shall be appointed by the Chairman of the Committee on Agriculture of the House of Representatives in consultation with the ranking minority member of the Committee; andSix members shall be appointed by the Chairman of the Committee on Agriculture, Nutrition, and Forestry of the Senate in consultation with the ranking minority member of the Committee.

Annual Appointments. To ensure an orderly transition from the current Board, consisting of 30 members, to the new Board, consisting of 18 members, and to ensure staggered terms, a total of 6 members shall be appointed each year, as follows:

Two members shall be appointed by the Secretary of Agriculture;Two members shall be appointed by the Chairman of the Committee on Agriculture of the House of Representatives in consultation with the ranking minority member of the Committee; and two members shall be appointed by the Chairman of the Committee on Agriculture, Nutrition and Forestry of the Senate in consultation with the ranking minority member of the Committee

(Note: In each of the years, 1997–1999, the terms of ten members of the current Board expire. The membership during the three-year transition period will be as follows: In 1997, 6 members are appointed and 10 members retire for a total board membership of 26; In 1998, 6 members are appointed and 10 members retire for a total board membership of 22; In 1999, 6 members are appointed and 10 members retire for a total board membership of 18.)

Qualifications. At least 3 of the members appointed each year under each of the above paragraphs shall be an individual who represents agricultural producers or agricultural industry.

Terms of Members; Vacancies. A member of the Board shall serve for a term of 3 years. A vacancy on the Board shall not affect its powers, but shall be filled in the same manner as the original appointment was made and the term shall be the remaining time of the original term.

Executive Committee. The Board shall establish an executive committee. As necessary to replace the officers, the members of the Board shall elect from among the member of the Board a chairperson, vice chairperson, and 3 additional members to serve on the executive committee for a term of two years. A majority of the executive committee shall be representative of agricultural producers or agricultural industry.

Executive Committee Duties The Executive Committee of the Board shall be responsible for working with the Secretary of Agriculture and the officers and employees of the Department of Agriculture to summarize and disseminate the recommendations and actions of the Board.

Board Duties. Review and provide consultation to the Secretary of Agriculture and the Congress on long-term and short-term national policies and priorities relating to agricultural research, extension, education and economics.

Establish long-term and short-term national policies and priorities relating to agricultural research, extension, education and economics.In establishing long-term and short-term national policies and priorities, the Board shall solicit opinions and recommendations from: (a) persons who will benefit from, and utilize federally funded agricultural research, extension, education, and economics; (b) symposia held to establish recommendations regarding priorities; (c) local, state and regional stakeholder groups; (d) organizations representing agricultural producers and industry; (e) sector recommendations, such as the Belt-wide Cotton Conference, Corn Utilization Conference, National Grain Sorghum Research Conference, and the National Barley Improvement Committee; (f) national conferences such as the FAIR 2000, the CROPS '99, and the American Association of Nurseryman symposia; and (g) from the scientific community.

Evaluate the results and effectiveness of agricultural research, extension, education, and economics with respect to the policies and priorities developed. Review and make recommendations to the Under Secretary of Agriculture for Research, Education and Economics on the research, extension, education and economics portion of the draft strategic plan required under the Government Performance and Results Act. Review the mechanisms of the Department of Agriculture for technology assessment. Within each of the broad funding categories for the National Research Initiative, the Cooperative State Research, Extension, and Education Service, the Economic Research Service, the Agriculture Research Service, the National Agriculture Statistics Service, and the Fund for Rural America, establish priorities for research.

On an annual basis, review the Inspector General's report on the financial and performance audits of Federal research projects and make recommendations to the Secretary of Agriculture and the Congress for ensuring that Federal research funds are spent in a cost-effective and efficient manner on priority areas.

Powers. Hearings - The Board may conduct such hearings, sit and act at such times, take such testimony, and receive such evidence as the Board deems necessary and appropriate for carrying out its duties.

Assistance From Other Agencies - The Board may secure directly from any department or agency of the Federal Government such information as may be necessary to carry out its duties. On the request of the Chairperson of the Board, the head of the department or agency shall, to the extent permitted by law, furnish such information to the Board.

Mail-The Board may use the United States mails in the same manner and under the same conditions as the departments and agencies of the Federal Government.

Assistance From the Secretary of Agriculture - The Secretary of Agriculture shall provide to the Board appropriate office space and such reasonable administrative and support services as the Board may request.

Future Opportunities. The Fund for Rural America (FRA), authorized under the 1996 farm bill, provides $100 million annually for fiscal years 1997, 1998, 1999. The FRA represents the only significant source of new agriculture research funding within the USDA. Currently, one third of the fund is dedicated to research, education and extension grants. The grants are awarded on a competitive basis and are not targeted to specific priorities; although the USDA has identified three objectives for utilization of the fund: international competitiveness, profitability and efficiency; environmental preservation and improvement; and rural community enhancement. One third of the fund is dedicated to rural development. The remaining third is to be used at the discretion of the Secretary of Agriculture for either research, education and extension, or rural development, or both. For fiscal year 1997, the Secretary designated the discretionary funds, which total $33 million, as follows:

$20.5 million for rural development; $10.0 million for USDA research priorities; and $2.8 million for a new competitive grant research program to examine ways to improve delivery of agricultural knowledge to rural communities.

Over 2000 applicants have submitted research proposals to be considered for a portion of the $46 million which were to be awarded under the competitive research grants program of the Fund. During consideration of the supplemental appropriations bill, the Fund was reduced by $20 million. Due to the fact that most of the rural development projects to be funded by the program had already been approved prior to the reduction, those cuts are likely to be focused on the remaining $46 million in FY 1997 for agricultural research, extension and education projects. This amounts to nearly a 45 percent reduction in the amount which can be allocated to those priorities, and will significantly reduce the amount of research which can be undertaken.

We recommend that the authorization of the Fund be extended from FY 1999 to FY 2002, and that in place of the discretionary allocation $50 million be dedicated to research, education and extension programs and $50 million for rural development projects.

In order to ensure that research, education and extension programs are implemented in a timely fashion, and avoid the potential that another round of reductions could be focused on the research portion of the FRA, we propose that the allocations for research, education and extension projects for FY 1998 and FY 1999 be dedicated to the following five priority areas within USDA's stated objectives:

National food genome project. Economically significant value added products. International competitiveness. Precision agriculture.

Food safety. For FY 2000 and thereafter, the National Agriculture Research, Extension, Education and Economics Advisory Board (Board) would designate no more than five priority areas to which the research, education and extension portion of the fund could be utilized.

We suggest the Board establish a panel for each of the five priorities to recommend to the Secretary of Agriculture the desired outcomes which would be part of the request for proposals under the Fund. The panels should include representation from the Board, as well as farm and commodity groups, private industry, universities, private research organizations and Federal agencies. These panels would review applications as to their relevancy to the established priority and, on an annual basis, report to the Board on the progress being made it meeting the desired outcome.

Eligibility for grants would be dependent upon the applicants established and demonstrated capacity to perform research or technology transfer related to the priorities, and would require successful applicants to establish a process for collaboration among both public and private research entities The applicants shall demonstrate the ability to create partnerships and mechanisms which ensure the integration and management of a complex array of regional, multi-state and multi-disciplinary resources, institutions and capabilities to the extent such activities are necessary and desirable in fulfilling the goals of the research.

To further improve stakeholder input, we recommend the Secretary publish the request for proposals in the Federal Register. A competitive, merit review process to select the entities to receive the grants should be established, and priority given to those applicants able to leverage funds from other Federal, state and/or private sources.

Under this scenario, the FRA would be utilized for a limited number of priorities which address complex problems and that require a significant initial investment, as well as cooperation and collaboration between the private and public sectors. The grants would be available to public and/or private institutions with the capability to coordinate, develop and deliver on a timely basis specifically desired products.

We believe this approach, when coupled with resources from other research programs, can yield significant results in the shortest amount of time on topics important to the future of U.S. agriculture without severely reducing our ability to address existing research priorities. In addition, this design can build a constituency for the FRA and encourage its review as a potential model for ensuring greater cooperation, and accountability within all agricultural research endeavors.

Conclusion. U.S. agriculture is undergoing unprecedented change in the manner is which crops are produced, processed and marketed. Reduced government intervention in agriculture, reflected both domestically and internationally, through increased privatization, market competition and global economic factors; consumer expectations relative to food quality, safety and convenience; concern about the environmental impact of agriculture and the prospect of new technological developments have all increased the risk and opportunity for U.S. agriculture producers and other production agriculture sectors. The ability of the U.S. agriculture industry to reduce risks and capture the benefits of change will in large part be determined by our ability to develop and adopt improved production and marketing practices and technology which reflect the industry needs associated with this new environment.

gricultural research, education and extension has a vital role to play in enhancing productivity growth and economic viability throughout the industry. We recognize and are appreciative of the positive impact the Federal/state/private research partnership provides production agriculture, U.S. consumers and others throughout the world. However, given the limited prospects for increased Federal investment in the system and the challenges faced by production agriculture, we believe it is appropriate to review several aspects of the system. Critical to the task before us is further strengthening the relationship between the partners in this important effort to better demonstrate to consumers, taxpayers and policy makers that increased investment in agricultural research, education and extension is in their own self interest.

We have provided several suggestions to improve the performance of the Federal agriculture research system. We believe improvements through enhanced opportunities for production agriculture to become more fully involved in establishing regional and national research priorities, and determining project relevancy similar to what is effectively occurring on the local level in many states would be a positive step. Additionally, we propose that mechanisms be adopted which will increase the accountability of the system to both the primary stakeholders and, importantly, to the general public. This effort should include a thorough review of existing funding mechanisms. Finally, although research funds are limited, we believe that exciting opportunities exist in several priority areas to provide a positive impact throughout production agriculture. We have proposed that the Fund for Rural America be utilized to address these big ticket, high priority issues as a potential model for the future.

Mr. Chairman, our organizations look forward to working with you and the members of the Committee throughout the reauthorization process to ensure the current and future research needs of agriculture are adequately addressed.

TESTIMONY OF NANCY CHAPMAN, OF THE ALLIANCE FOR CONTINUING NUTRITION RESEARCH & MONITORING

Mr. Chairman and other members of the subcommittee, thank you for allowing the Alliance for Continuing Nutrition Research and Monitoring the opportunity to submit this testimony to this Subcommittee. The alliance consists of 11 groups representing farmers, health professionals, physicians, scientists, food technologists, educators, and food manufacturers. The alliance is a diverse constituency of approximately 15 million individuals, and is united in its support of human nutrition research and monitoring. The true tally of supporters could include the entire population because everyone gains from the valuable contributions of human nutrition research, as we illustrate in our testimony. I am Nancy Chapman, a public health nutritionist, member, and volunteer of several of tne groups represented here today. I have used the health and dietary information from the Federal surveys and the findings of Federal nutrition research throughout my professional career as an evaluator, educator, policy analyst, and communicator.

Congressman Combest, you have long been a champion of agriculture research and recognize that the advances in agriculture, as well as human health, depend in large measure on high quality research, conducted in both public and private institutions. This Alliance wants to describe to you and your esteemed colleagues the numerous junctures among animal/plant science, human nutrition research, agriculture production and human health. We want you to envision nutrition research along with food science, agricultural biotechnology, and other research fitting together as a train moving agriculture more quickly, smoothly, and efficiently down the competitive track in a global economy. Human nutrition research and monitoring help: focus Federal food assistance programs where they are most needed; health professionals to devise strategies to lower the risk of heart disease, cancer, diabetes, osteoporosis, and other diet-related diseases by increasing the understanding of specific relationships among diet, heredity, and lifestyle.

Reduce health care costs due to lower incidence of chronic diseases; generate a more nutritious food supply by identifying health-promoting properties of plant and animal foods in a balanced diet; identify public health problems that can be corrected through changes in food supply such as nutrient fortification, fat reduction, and interventions to prevent obesity; keep dietary guidance current and appropriate for nutritionally-vulnerable groups from infancy to old age to realize full growth, development, health, and physical well-being; and provide data for estimating possible intake of incidental contaminants, pesticides, and naturally occurring toxic substances as part of regulating the use of certain substances.

Return on Investment. Conservatively, the approximate $60 million investment in USDA nutrition research and monitoring guides over $40 billion in food assistance expenditures. The Federal investment in USDA research has also guided the well-known nutrition labeling program and the USDA/DHHS Dietary Guidelines for Americans. Research also guides the nutrition education programs in schools, preschools, hospitals, and elderly feeding programs as well as such public campaigns as, Five-A-Day for Better Health. These and other nutrition education programs have the potential for reducing some of the $200 billion annual costs for treatment and care of diseases linked strongly to nutrition, such as cardiovascular diseases, high blood pressure, diabetes, cancer, obesity, and osteoporosis. Virtually all major chronicle and degenerative diseases are linked to nutrition. This will become increasingly important as our country's population ages.

Request for Congressional Support. Because the Federal Government receives an excellent return on its investment in human nutrition research and monitoring, the Alliance for Continuing Nutrition Research and Monitoring believes Congress should readily support three core elements of nutrition research and monitoring. These requests mirror the President's Human Nutrition Initiative in the USDA budget and are as follows:

Maintain a comprehensive nutrition monitoring system that harmonizes the health research of the National Health and Nutrition Examination Survey (NHANES) and the dietary data from the Continuing Survey of Food Intakes by Individuals (CSFII) without losing essential components of either survey. The President's budget includes additional $6 million of funding to determine the food consumption of infants and children that will enable better estimates of dietary exposure in reassessment of pesticides under the 1996 Food Quality Protection Act.

2. Provide measures and support that assures updating and reporting nutritional status, food consumption and composition data in a timely manner that reflects advances in technologies and plant and animal breeding. Accurate nutrient data information available from industry, commodity groups, and other private sources, often developed for nutritional labeling, should be incorporated into databases to portray the new products in the market place.

3. Allocate sufficient funding to support basic human nutrition research at USDA. The President's budget requests an additional $6 million dollars of funding for USDA nutrition research to meet the challenges of the new century.

A Comprehensive Nutrition Monitoring System, Its Time Has ComeCongress passed the National Nutrition Monitoring and Related Research Act of 1990 with the expectation that the existing NHANES and CSFII surveys would be well-coordinated in data collection, analyses, and reporting. This goal has not been achieved. It is time for Congress to restate the expectation that USDA and DHHS closely collaborate to establish a comprehensive nutrition monitoring system that provides timely and pertinent data on food and nutrient intakes, health indicators, and sociodemographics. Requisite funds for such a system are justified given the extensive use of the data for directing Federal food assistance expenditures, public health programs, pesticide registrations, food labeling, dietary guidance, food additive evaluations, and developments of new products, seeds, and breeds. For example, food consumption data underpins the Thrifty Food Plan (TFP) on which the food stamp benefit levels are based.

Survey data are used by programs such as the Supplemental Food Assistance Program for Women, Infants, and Children (WIC) in determining what nutrients and foods should be targeted in the WIC food package for recipients; data are also used to determine the size of the potential WIC population.

An additional $6 million of funding has been requested by the President to survey infants and children's food consumption to better estimate nutritional risk, exposure to environmental contaminants, and dietary exposure to pesticides and other substances for purposes of registering and reassessing a product. This supplement in the budget is critical in light of EPA's review of pest control substances under the Food Quality and Protection Act.

Food Composition Data Must Reflect the Current Food SupplyUSDA and DHHS have progressed in revising and maintaining food composition tables to analyze the food consumption data from NHANES and CSFII, however, much more is necessary to make the nutrient database more efficient and effective. With the rapid advancements in technology to lower fat, sodium, and calories in foods, estimates of food and nutrient intakes would be rendered inaccurate if food composition databases are not kept current. Forming partnerships with the food industry and commodity groups would permit updating databases, using information developed for nutrition labeling or similar purposes.

Nutrition Research Has An Important Role In USDA. In previous legislation on agriculture research, Congress established USDA as the Federal Government's lead agency for human nutrition research and recommended developing national human nutrition research centers. With health care costs rising, this is a great time to invest in USDA nutrition research grants to attract the best investigators to explore tomorrow's health challenges. The unique combination of disciplines, cross fertilization of research projects, and varied cluster of talented researchers can produce the next major steps to improving diets and maintaining health.

USDA funding of the six Agriculture Research Service (ARS) laboratories and competitive grants has led to many breakthroughs in human nutritional science. But our overall knowledge of nutrition fails to keep up with emerging information about how the brain develops, how the immune system resists infectious disease and fights off foodborne illness, and how the body ages. Additional funding for USDA nutrition research will advance our understanding of critical changes that need to be made in our food supply, dietary advice, gene/nutrient interactions, plant and animal composition, and public health programs to keep our nation healthy and economically competitive.

Let me share just a few breakthroughs that illustrate where USDA Nutrition Research is advancing a critical knowledge base. Improved protein profiles of beans and grains to advance human growth and development makes these commodities more desirable in heart healthy diets and in emerging economies. An ARS developed product known as Oatrim, which received a lot of press recently, is a high fiber fat substitute which improves glucose tolerance, lowers blood lipid levels, and produces weight loss, subsequently preventing some forms of heart disease. The ARS Carotenoid Research Unit in Beltsville is currently involved in leading research on carotenoids. New research showing tumor control in animals fed certain plants may hold promise for humans. Recent studies suggest plants such as soybeans, fruits, and vegetables naturally contain substances such as phytoestrogens that may lower cholesterol, halt or perhaps prevent tumor growth, or retard osteoporosis. Studies have also shown a positive effect of trace elements (or constituents) on disease prevention such as folic acid and neural tube defects, chromium and diabetes, selenium and cancer, and copper and heart disease.

Role of private sector in advancing human nutrition research and monitoring. Alliance members have supported basic nutrition research and clinical trials, conducted food and nutrition research and surveyed consumers about dietary and health behaviors. We all agree that the Federal Government must maintain the primary responsibility for gathering comprehensive data on all population groups and building the foundation of fundamental nutrition research.

In turn, health, nutrition, commodity, and food industry groups have invested in food and nutrition research that expands knowledge, but usually in a direction commensurate with an institutional mission. Examples of alliance members' investment in nutrition, food and consumer research include:

since 1995, $861,000 has been spent on investigating the role of soy protein and phytoestrogens in fighting cancer;$600,000 per year to assess the role of dietary cholesterol on health; $2 million annually for food safety, nutrition and consumer education programs; almost $40 million in research in diet, nutrition and cancer prevention and treatment;more than $2 million over the past 5 years to conduct observational and intervention studies of the impact of infant feeding practices on growth and health outcomes in early childhood, and nutrient bioavailability from weaning foods; and several studies tracking eating behaviors and nutrition knowledge of adults and children.

Congressmen, you face difficult decisions about how to set priorities for agriculture research dollars. The practical public and private uses of the data from nutrition research and monitoring efforts at USDA, outlined in our testimony, are clear evidence that these programs warrant your continued support. The Alliance wants you to view nutrition research as a safeguard on Federal expenditures. For every $1 spent on USDA nutritional research, we assure that $570 of Federal funds allocated for USDA food assistance programs are spent wisely. Factoring in the various ways the USDA nutrition research and monitoring data are applied, this multiplier would be astronomical.

We thank you for giving the alliance a voice to explain the significant benefits of nutritional research to agriculture and the public well-being.

STATEMENT OF NEBRASKA GRAIN SORGHUM BOARD AND NEBRASKA GRAIN SORGHUM PRODUCERS ASSOCIATION

Mr. Chairman and Members of the Committee:

On behalf of Nebraska's grain sorghum farmers, we are pleased to have the opportunity to submit testimony regarding the future of agricultural research.

Through the years, agricultural research has provided knowledge and technology that has resulted in tremendous economic benefit to the U.S. economy. Over time, the mission of agricultural research has remained the same: to unlock and develop new information, techniques and products that help solve problems for American producers and consumers.

The public's investment in agricultural research has enabled U.S. farmers to become the world's most efficient producers of a wide array of abundant, high quality food at an affordable price. The need for continued public support for a strong agricultural research program is more important than ever if the United States is to remain on the cutting edge of technology and a world leader in food and fiber production.

Recent changes in U.S. farm policy require American farmers to secure a greater portion of their income from the marketplace, rather than relying on government programs. They must become active players in world markets. At the same time, they must respond to public concerns about the environment and food safety issues. These factors make it paramount that strong support for agricultural research and marketing remain in place to facilitate this transition and to assist in addressing important societal concerns.

Legislation to reauthorize agricultural research programs must provide adequate funding and a means to identify, implement and evaluate priorities for research, education and extension programs. The process for priority-setting and evaluation must include producers since they are the primary stakeholders.

A mix of formula, competitive and special earmarked funding is required to maintain an effective agricultural research system of top-quality scientists and facilities. The distribution and allocation of funding should be thoroughly evaluated to make certain that the dollars are most effectively and efficiently applied.

In Nebraska, Federal formula funds are matched five to one by state appropriations, and together, these funds provide an appropriate level of infrastructure to carry on base programs and retain the capacity to respond to new needs as they arise.

Competitive grant funding provides the resources for fundamental research that will enable U.S. agriculture to stay on the cutting edge of technology in production, processing, marketing and environmental and natural resource conservation. Through the competitive grants program, resources can be targeted to issues of national importance that require immediate answers. Funding is also necessary to address unique problems that may exist in limited regions or states that are not readily addressed by other means. Where possible, Federal funding should be leveraged with state, local or industry resources.

Partnerships formed between university scientists and private companies will provide a means to more rapidly commercialize ideas and technology developed in research programs. Care must be taken, however, to assure that research findings do not become proprietary and result in limitations or restrictions in the access to knowledge and technology.

Cooperative agreements and collaborative projects should be encouraged among researchers and entities to leverage resources, integrate knowledge and avoid redundancy and unnecessary duplication of effort.

We would point to the Central Plans Grain Sorghum Breeding Program as an excellent example of this type of cooperation. This unique arrangement involves the University of Nebraska, Kansas State University and the USDA Agriculture Research Service and encourages cooperation on all grain sorghum research projects—especially breeding programs, field-testing sites, joint hiring practices, etc. Joint appointments between the institutions will also be encouraged.

Extension/education programs play a vital role in assuring that research information and technology gets transferred from the laboratory to the field in a factual and unbiased fashion. These programs should be designed to stay current and address the needs of agriculture that cannot or are not otherwise being addressed by the private sector.

To make certain that research funds are properly targeted and invested, a review process is vital. It is critical that agricultural producers are involved in this review process, along with the scientific community. We share the concern of other agricultural groups that the membership structure of the current National Agricultural Research, Education and Economics Advisory Board demands review and modification.

There currently exists an imbalance in the representation between the scientific community and agricultural producers. We feel strongly that involvement of the primary benefactors of the research is paramount in assuring that research programs are relevant and targeted to priority areas. Producers and industry should represent at least 50% of the committee membership.

In reauthorizing the research program, great care must be taken not to dismantle programs and services that have longstandingly provided value to producers and consumers. We, however, understand the need to be responsive to the changes in needs and limitations on available resources. The sorghum producers in Nebraska pledge to do our part in providing strong industry leadership and dollars to support sorghum research programs.

U.S. grain sorghum acreage in recent years has experienced a dramatic decline. While there are a number of factors that have contributed to the situation, limitations in research dollars, both public and private, have prevented the same rate of genetic improvement for sorghum that other commodities have enjoyed. We remain confident, however, that there are exciting opportunities yet to come for increases in sorghum production and the discovery of new food and industrial uses. Those opportunities and discoveries are, however, dependant upon a strong research, extension and education program.

We urge Congress to reauthorize the agricultural research programs and are eager to do our part in identifying research priorities for grain sorghum that will ensure effective and efficient use of public resources.

QUESTIONS FOR DR. ROBINSON

National Food Genome Strategy

1) Your proposal for a National Food Genome Mapping Initiative would authorize $50 million per year for 4 years. Would this be new money, or do you propose to cut other programs? If so, which ones?

Dr. Robinson. Our proposal is for new money from mandatory funds for research.

2) What would be the division of resources between the animal and plant genome initiatives? What about the division between species?

Dr. Robinson. There will be further discussion this Fall of the Food Genome Mapping Initiative based in part on a final report that is due this December from the National Science and Technology Council's Interagency Working Group (IWG) on Plant Genomes. These discussions will include input from representatives in industry, academia, and others in the field of genomics research who can provide invaluable insight for effective program planning and coordination. Possible areas of discussion include: multi-Federal agency involvement; private/public coalitions and international partnerships; bioinformatics (curation, distribution, and software); requisite technologies and strategies for mapping and sequencing; infrastructure and other resources.

Formula Funds- Increased Flexibility

3) On page 11 of the USDA testimony flexibility is recommended for up to 25 percent of formula funds. While I think we need to examine in depth the accountability of these funds let me first ask why USDA is proposing to increase flexibility for how land grant universities use these funds and not proposing to expand the eligibility of these funds to non-land grant universities with proven expertise in agricultural research?

Dr. Robinson. The Administration proposes that land grant universities be allowed to direct a portion of Federal formula appropriations (10 percent of the 1997 base beginning in 1998, increasing to 25 percent of the 1997 base in 2002, and 25 percent of new funds above the 1997 base in 1998, increasing to 100 percent of new funds above the 1997 base in 2002) to approved purposes under either the Smith-Lever or Hatch Acts. This flexibility will provide universities with increased ability to address highest priority issues and functions, and respond to opportunities or crises.

Formula funds are allocated to states to support research and education partnership programs at land grant universities established under the first and second Morrill Acts (1862 and 1890). Under these laws, States designated or established universities as land grant institutions. States provide funds to match Federal allocations. The initial designation of land grant universities and appropriation of matching funds are State decisions. Several States elect to suballocate research formula funds to more than one agricultural experiment station in the State.

The Administration supports broad competition for non-formula based programs among both land grant and nonland grant universities.

4)Your proposal recommends that 25% of formula funds be required to meet multistate, regional or collaborative requirements. Why was this requirement not also recommended for ARS funds?

Dr.Robinson. Agricultural Research Service (ARS) laboratories are charged with addressing issues of national scope and impact and providing the research base for action and regulatory agencies of USDA. The programs of ARS are coordinated through the National Program Staff and implemented through federally owned and managed laboratories. As such, a requirement for regional coordination is not needed to meet the mission of the agency. It is the case, however, that ARS scientists are active in many regional research projects and collaborate extensively with university and other Federal scientists.

5) Your recommendation 4.1 opens 3d funds to all institutions. For the record, would this requirement cover all 3D funds or only competitively awarded 3D funds?

Dr. Robinson. The Administration proposes that Smith-Lever 3(d) funds be available to all land grant universities, including those established in 1862, 1890, and 1994. Further, where competition is deemed appropriate to achieve the mission of programs funded under the 3(d) authority, competition would be open to all established, U.S. colleges and universities.

Fund for Rural America

6) You refer to the funding pattern in the Fund for Rural America as a technical flaw. I would take issue with that. The current funding scheme of obligating money in the fall of each year was the intention of the Congress during the farm bill conference and I see no need to change it. Has the research portion of the fund expended any of these funds yet?

Dr. Robinson. The first round of funding for the Fund for Rural America became available to the Department in January, 1997. The provisions of the Fund allow two year authority for the competitive grants program. Review and award decisions for planning grants are complete. Standard grant awards will be made in November, 1997. Center grants, a follow-on to planning grant awards will be made early in the calendar year.

7) It has been nearly 16 months since the fund was established, why have none of the grants been distributed yet? When do you expect to mail the first round of checks?

Dr. Robinson. The competitive grants portion of the Fund was established in January, 1997. The first request for proposals (RFP) was released that month. Competitive award processes require time for scientists and educators to respond to the RFP, the Department to conduct of a peer review process to assure scientific, educational, and programmatic merit of proposals, the National Agricultural Research, Education, Extension, and Economics Advisory Board to conduct a relevance review; and technical and financial review of award documents. Awards will be made beginning at the end of August.

8) Under the current schedule wouldn't money be obligated and checks mailed out for projects this fall and the fall of the next two years? **Explain to me why that is a problem.**

Dr. Robinson. The initial solicitation of proposals for the competitive grants program under the Fund for Rural America generated substantial interest in the agricultural research and extension community. More than 1700 proposals were received from a wide range of public and private institutions across the nation. Many proposals involved new partnerships formed to address critical issues facing American agriculture, extend new technologies, or link scientists, educators and communities. The momentum generated in this new, short-term program will be lost if the next cycle of the fund is delayed until Fiscal Year 1999.

9) In the draft bill of the Senate Agriculture Committee, there is a proposal to extend the Fund for Rural America for an additional 5 years. If you support this proposal, and considering this is mandatory money, where would the Department suggest taking the $500 million in offsets from?

Dr. Robinson. The Administration does not propose extending the Fund for Rural America as a program supported with mandatory money.

Combination of Research and Extension Funds

10) Can you tell us how the cooperation between research and extension has, or will in the near future, improve both here in Washington as well as in the field between researchers and extension educators?

Dr. Robinson. With the reorganization of the U.S. Department of Agriculture in 1994, resulting in the formation of the Cooperative State Research, Education, and Extension Service, there has been substantial improvement in national program planning and implementation. The new administrative structure encourages links between fundamental and applied research, education, and technology transfer. It also has resulted in reduced paperwork (for example, one integrated proposal from an institution for the pesticide impact assessment program is adequate to support funding under both the research and extension programs), streamlined staffing, and joint development of accountability strategies.

The Federal reorganization and integration of research and extension programs did not mandate similar integration at the university level. As a decentralized system of university- based agricultural research, education and extension, there is substantial diversity in organizational structure and administrative practices across institutions. This system, with leadership of the Cooperative State Research, Education, and Extension Service, is committed to a common set of national goals, coordination of efforts across states and regions, and accountability in keeping with the Government Performance and Results Act.

Aquaculture questions from Rep. Pickering:

11) Why is the Department of Agriculture interested in reauthorization of the National

Aquaculture Act and the research, extension, and education programs that support aquaculture such as the Regional Aquaculture Centers?

Dr. Robinson. The United States has an important opportunity to develop a globally competitive aquaculture industry to serve the national needs and international markets. Global demand for aquacultural products is projected to increase sharply over the next several years, while harvests from commercial ocean fisheries are stable or declining. A dramatic increase in aquaculture is needed to meet future demand for aquatic foods and products, to offset a multi-billion dollar U.S. fisheries trade deficit, and to offer consumers abundant supplies of high quality, safe, wholesome, and affordable aquacultural products. Sustainable, environmentally responsible aquaculture development holds particular promise for rural communities.

Reauthorization of the National Aquaculture Act of 1980 and the aquaculture research, extension, and education provisions of the Farm Bill would greatly improve prospects for this growing sector of the food and fiber industry. Additional proposed provisions would strengthen the Department of Agriculture's ability to provide a variety of services and programs to the aquaculture industry.

12) What key provisions of the National Aquaculture Act would be re-authorized in the Administration's proposal?

Dr. Robinson. The key provisions of the National Aquaculture Act of 1980 that would be reauthorized include: the establishment of a national aquaculture policy; the authorization for the development, implementation and revision of a National Aquaculture Development Plan; the establishment within the Office of Science and Technology Policy, Executive Office of the President, the Joint Subcommittee on Aquaculture (JSA) as the primary coordinating body for Federal activities in aquaculture; the establishment of the Secretary of Agriculture as the permanent chairman of the JSA; and the establishment of a National Aquaculture Information Center within the Department of Agriculture.

13) What new provisions are included in the Administration's proposal for reauthorization of the National Aquaculture Act?

Dr. Robinson. The Administration is proposing two additional provisions to be included in the reauthorization of the Act. The first provision would establish aquaculture as a form of agriculture for programs of the Department of Agriculture. The second provision would establish an aquaculture commercialization program to accelerate the transfer of promising research and technical advances, to commercial aquaculture.

14) What does it mean to establish private aquaculture as agriculture for USDA programs and activities?

Dr. Robinson. The treatment of private aquaculture as a form of agriculture would strengthen the ability of the Department of Agriculture to provide services and programs to the aquaculture industry that are provided to other sectors of agriculture. This provision would provide for greater emphasis and standing for private sector aquaculture within the Department of Agriculture. The Secretary would have clear authority to treat cultivated aquatic animals and plants, and their products, produced through commercial aquaculture, as livestock, crops, and commodities.

15) What is the commercialization program? How would it work? What are the goals and benefits of the program?

Dr. Robinson. The program would be established to accelerate market development and commercialization of aquaculture research findings and technologies developed from existing research programs. Emphasis would be placed on technologies that can improve profitability, production efficiency, and the sustainability of existing and emerging sectors of aquaculture. The Secretary would have the authority to make grants to cover the Federal share of any project carried out under this authority. The Secretary would establish procedures for competitive review and evaluation. Priority would be given to projects carried out under commercial conditions at private, commercial aquaculture facilities. Field testing and commercial field trials for promising technologies would be encouraged. The program would encourage private and public sector partnerships to accelerate the adoption of promising research findings and technologies in order to enhance the global competitiveness of the U.S. industry. Current research and technology transfer authorities provide limited opportunities to address this need.

16) What other programs and activities at USDA would be re-authorized by this provision?

Dr. Robinson. The Administration's proposal includes the reauthorization of all research, extension, and education programs within the Department that are applied to aquaculture including the Regional Aquaculture Centers. Reauthorization of these provisions are critical to the continued progressive and sustainable growth of the U.S. aquaculture industry. The continued growth and competitive position of the U.S. aquaculture industry in a global marketplace will be directly related to the resources invested in research and technology development.

Questions from Rep. Farr:

17) Considering that it takes about seven years to go from lab to field with a new product, how is ARS prioritized? Do the most threatened phase-outs have the highest priorities? What priority is given to methyl bromide?

Dr. Robinson. The Agricultural Research Service (ARS) recognizes that there are inadequate resources to address all issues of importance to American agriculture. The U.S. Department of Agriculture (USDA) sets research priorities based on input from Congress and client groups. Through discussions, workshops, field days, and other interactions, the greatest research needs are identified and addressed by USDA within the guidelines and funding set by Congress. One of the factors used in setting priorities is the urgency of the issue including the threatened loss or phaseout of critical control measures.

Because of the potentially severe impact the phase-out of methyl bromide could have on U.S. agriculture, Congress has directed ARS to search for alternatives. The Administration, USDA and ARS have all placed a very high priority on research to do so.

18) Many states and local governments are moving faster than the federal government in regulating health risks, resulting in fewer compounds on the market to fight insects, pests and disease. Knowing that, does USDA research move to fill the gap?

Dr. Robinson. A considerable amount of USDA research is addressing this issue. A major thrust of the Department's IPM Initiative is the development of pest management approaches that give agricultural producers and pest managers in urban settings the knowledge and technologies they need to manage pests in an economically and environmentally sound way. The Administration's FY 1998 Budget Request included an increase of $13.186 million for the ongoing Initiative. While the appropriations bill is not final, it looks as if there is only partial support for this request from the Congress - more from the Senate than the House.

We believe that the IPM research and education programs supported by USDA are critically important in helping U.S. agriculture adjust to changes resulting from implementation of the Food Quality Protection Act of 1996 (FQPA). FQPA requires review of "high risk" pesticides, and may result in cancellation of registrations of many pesticides. Research will be needed to find new approaches to managing pests as some of the most widely used pesticides are removed from the market. Extensive education will be needed for those who work in food production, processing, and distribution systems regarding use of pesticides.

As you are aware, specialty crop growers are particularly vulnerable when pesticide registrations are lost due to regulatory action. USDA supports many successful IPM efforts for specialty crops and will continue to do so. For example, public concerns about the use of pesticides led California's processed tomato industry to form a partnership with the University of California to develop and implement improved pest management methods. This resulting IPM system has been implemented by about half of the state's processed tomato producers, resulting in a 40 percent reduction of pesticide use and a $10 per acre increase in profitability. Recently, the University of California IPM Program used Smith-Lever 3(d) funds for Pest Management Education to validate disease forecasting models on several specialty crops including grapes, pears, tomatoes, lettuce and strawberries. These models allow producers to reduce fungicide applications by 25 to 50 percent on those crops, a fact that is especially significant since fungicides are one of the most targeted and also one of the most important pesticides used in specialty crop production. There are successful specialty crop IPM efforts in other states. For example, IPM research and education conducted by Texas A&M University saved $1.5 billion per year and spared the environment 17.3 million pounds of insecticides alone. One IPM program in the Rio Grande Valley for carrots destined for baby food, soup and frozen foods reduced insecticide use by 66 percent while increasing individual farmer profits by $22,000. At the same time, 20,000 new jobs in the state are associated with IPM. IPM research and extension efforts at Oregon State University helped growers reduce their need for miticide applications from three to one per year on twenty thousand acres of apples, for a savings of $120,000.

The USDA IPM research and education efforts that specifically address the issue you raised are supported primarily by the Agricultural Research Service (ARS) and the Cooperative State Research, Education, and Extension Service (CSREES), and include programs such as the Areawide IPM Program (ARS), IPM and Biocontrol Research (CSREES), the Pest Management Alternatives Program (CSREES), Pest Management Education (CSREES), and Sustainable Agriculture Research and Education (CSREES). USDA's budget for Fiscal Year 1998 proposes additional resources for these programs to permit us to respond to the needs of agricultural producers more quickly.

19) As we know, methyl bromide is used for soil fumigation, post harvest protection and quarantine applications, how is research divided into these three categories with phase-out only a few years away?

Dr. Robinson. As of FY 1997, 2414.7 million within the ARS budget is allocated for methyl bromide alternatives research. About 247.05 million (48%) is directed at soil fumigation alternatives and 247.65 million (52%) is allocated for postharvest alternatives most of which is associated with quarantine applications.

20) Modern public sector ag research must, like public health, respond to problems. Specifically, how does the research you are doing on alternatives to methyl bromide get to farmers in the field?

Dr. Robinson. ARS regularly meets with representatives of agricultural industries to discuss and report on the research being done on methyl bromide alternatives. Results of ARS research are also presented at various scientific meetings including the Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reduction that is widely attended by representatives of grower organizations. In addition USDA publishes a quarterly newsletter entitled *Methyl Bromide Alternatives* which has a circulation in excess of 4000 and is available on the Internet. Finally ARS, in cooperation with state universities and private agriculture industries are conducting field-scale validations, many on farmers' lands in which promising experimental alternatives are tested for commercial feasibility.

21) Why do specialty crop farmers (which receive no government support) have such a small percentage of the research budget? Is this an area that government research could have a dramatic impact?

Dr. Robinson. Most specialty crops are also considered horticultural crops. Research funds for speciality crops exceed those of major crops on a proportional basis looking at farm gate receipts. The Cooperative State Research, Education, and Extension Service (CSREES) through its partner, the Land Grant University System, sets research priorities at the local, state, and regional basis. At the same time CSREES funds specific research for Tropical and Subtropical Agriculture, viticulture, small fruits and berries. These programs specifically address specialty/horticultural crops production and protection. Extension programs are also an integral part of the work being done with these crops.

CSREES feels that adequate funds are spent on research and extension programs in specialty crops.

August 5, 1997

The Honorable Larry Combest
Chairman
House Agriculture Subcommittee on
Forestry, Resource Conservation and Research
Room 1301, Longworth House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed is the joint response from the National Association of Wheat Growers, National Barley Growers Association, National Corn Growers Association and the National Grain Sorghum Producers to the questions from the Subcommittee in your letter to Mr. Kenneth Rose, dated July 28, 1997.

Our organizations would like to congratulate you and the Subcommittee for engaging in the series of public hearings on reauthorization of the research title to the 1996 Farm Bill. We know the process of organizing and holding hearings is both a time consuming and difficult endeavor.

In addition, we would like to thank you for the flexibility you demonstrated in adjusting the hearing panels to accommodate Mr. Kenneth Rose who represented our organizations before your committee. We greatly appreciate your effort in ensuring that our organizations were able to participate in the final hearing of the series.

As the Committee proceeds with the development of legislation to reauthorize the research title to the farm bill, we are prepared to provide whatever assistance you feel would be helpful in this important effort.

Sincerely,

National Association of Wheat Growers
National Corn Growers Association

National Barley Growers Association
National Grain Sorghum Producers

August 7, 1997

National Association of Wheat Growers
National Barley Growers Association
National Corn Growers Association
National Grain Sorghum Producers

HOUSE AGRICULTURE SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION AND RESEARCH

RESPONSE TO QUESTIONS:

Limit Federal Funds to National or Multi-State Priorities -

(1) We concur with the need to maintain federal support for "basic" research. We also believe that federal funding of basic and applied research should be focused on priorities that have national or multi-state relevancy, or areas where the incentive to invest by others is limited even though the expected benefits to producers and/or consumers could be quite high. While we appreciate the fact that the economic benefit from all research, particularly basic research, may be difficult to predict in advance of the work being done; we believe that one test of a project's relevancy and funding justification should include an examination of the potential benefits, including economic, which the research could provide. We would expect that such a test for basic research would be somewhat different than for applied research in terms of both the specificity and time-frame which would apply to the two types of research endeavors.

The current limitations on funding of all agricultural research require difficult decisions concerning funding allocations and grant approval. Engaging in research purely for the purpose of scientific exploration, without a reasonable hypothesis as to the expected benefits, may in fact be a luxury we cannot afford. We do not believe that the only test of a project's worthiness should be that it "yield economically significant and quantifiable results", but information relative to potential outcomes should be an important consideration in the approval process for both basic and applied research.

(2) We agree that the ratio between basic and applied research should not be established by Congress in legislation. We do not support dedicating the National Research Initiative (NRI) to basic research. In addition, we do not believe research performed with NRI grants should be exempt from providing outcome projections which indicate the benefits which the research is hoped to provide.

National Association of Wheat Growers
National Barley Growers Association
National Corn Growers Association
National Grain Sorghum Producers

Funding for Extension -

(3) The term "food and agricultural sciences" is defined, in a broad way, to describe the activities upon which agricultural research, extension and teaching are focused. We do not disagree with the broad subsets within that definition in terms of identifying issue areas for the system. In terms of identifying those who should be engaged in the consultative process as USDA and other federal agencies develop strategic plans, objectives and priorities for agricultural research and extension; we believe a definition which identifies the primary stakeholders in that system should be added to Section 1404 of the Act. Our definition distinguishes between agricultural producers, who many would define as farmers and ranchers; and the broader category of those directly involved in the production agriculture industry. The production agriculture industry would include farmers, ranchers, foresters and aquaculturists as well as those engaged in the formulation, production and marketing of inputs necessary for agriculture production as well as those involved in processing, transportation, storage and merchandising of agricultural products. Everyone in the U.S. and throughout the world can claim to be a stakeholder in our system of research and extension. We believe that narrowing that definition to production agriculture as the primary stakeholders will provide greater focus and relevancy to USDA activities, and create a broader base of active support for its specific activities.

Combination of Funds -

(4) In our testimony, we encourage that a significant amount of the funding for research and extension be combined into a single allocation. We recognize that in some areas of research, especially during the early stages of basic research, an ongoing, day-to-day extension component may not be necessary. We do believe however, that even in the case of the most basic research, an education, information or outreach program is necessary at some point to ensure that stakeholders are apprised of the work being undertaken, the progress being accomplished, and its relevancy and potential benefits. By combining these two components, program and project accountability can be enhanced, and the base of support for these endeavors increased for both basic and applied research. In addition, a combined allocation should help ensure the rapid transfer of new information and technology to production agriculture. In many instances, even preliminary results can be utilized to encourage additional private investment and development of new processes, technologies and products beneficial to U.S. agriculture. This will help American agriculture maintain its comparative advantage in a competitive, global agricultural economy.

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The current allocation system does not ensure that research and extension are coordinated, or even addressing the same over-all objectives and priorities. Given the overall funding limitations, the broad, general nature of the USDA research and extension goals, and an expanded mission for extension personnel into a variety of social service functions; the ability to devote financial and human resources to outreach programs beneficial to production agriculture continues to decline.

Advisory Board -

(5) Our concerns about the lack of "stakeholder" participation on the Advisory Board are due to the broad representation required in the law, the size of the Advisory Board, and the nominations process. Advisory Board membership is based on membership or representation of one of 30 identified categories contained in the law. These categories provide a bias in favor of those who represent public institutions or organizations with a direct and established relationship with those institutions. In effect, the Advisory Board in comprised of many of the institutional representatives it was established to advise.

This difficulty is further compounded by the broad representation requirements for the remaining positions which effectively limit the Board's ability to independently develop an agenda which might differ from that of the institutions or USDA. In addition, the USDA appointment procedure allows the Department to select Board members who are predisposed to respond in a positive fashion to its proposals.

(6) Yes, our organizations submitted nominations for both categories. No, the nominations we submitted were not accepted.

(7) Currently, the balance between plant and animal agriculture is based on the law which requires the appointment of two representatives from each sector, or 6.7% of the Board. We believe that by requiring at least 50% of the Board be comprised of representatives of production agriculture, each sector is likely to receive a higher percentage of representation. However, if this is an area of concern, we would suggest that an informal arrangement between the two Agriculture Committees of Congress and USDA could be established which would ensure balance between the two sectors.

National Association of Wheat Growers
National Barley Growers Association
National Corn Growers Association
National Grain Sorghum Producers

Congress could assure that some scientist are appointed to the Board in a number of ways under the restructuring mechanism we outlined in our testimony. First, at least 50% of the Board would be required to represent production agriculture. In many instances those representatives could well be scientists employed in the private sector, or have strong scientific backgrounds. Secondly, the remaining 50% of the membership could be appointed from a broad range of organizations or interested parties, including the scientific community. We would hope and expect that both the Congress and USDA would in fact appoint a number of scientists representing various disciplines to provide technical expertise in addition to the ex-officio members appointed by USDA.

By ensuring that 50% of the Board does in fact represent production agriculture, we believe the Board will undertake a more independent role in the advisory process, and yet continue to work closely with USDA as well as with the Congress. The purpose of restructuring the Board is not to create an adversarial relationship between it and USDA, but to provide a perspective that more adequately represents the various sectors within production agriculture with the goal of improving the over-all performance of the system.

August 11, 1997

TO: US House of Representatives Committee on Agriculture
Subcommittee on Forestry, Resource Conservation and Research

FR: Animal Agriculture Coalition

RE: Hearing July 22, 1997

Please accept the attached written response into the official record for the hearing held on July 22, 1997 by the US House of Representatives Committee on Agriculture, Subcommittee on Forestry, Resource Conservation and Research, as requested by Chairman Combest.

Limit Federal Funds to National or Multi-State Priorities

1) In the testimony, witnesses went into detail regarding the need to maintain Federal support for "Basic" research. However, in the discussion of the need to focus research investments on National or multi-State priorities, witnesses stated that expenditure of Federal funds should be limited to research and extension projects which yield economically significant and quantifiable results. I'm afraid that a requirement that projects have an "economically significant result" could adversely limit the ability to conduct basic research in which the economic benefits may not be known for 5, 10, or even 50 years. What do you propose to ensure that this requirement not limit Federal investment in basic research?

2) Later in the testimony, witnesses suggested that Congress not mandate specific funding ratios between basic and applied research. Witnesses also referred to the National Research Initiative (NRI) as a mechanism to fund basic research. Would you agree to a proposal that would A) limit the NRI to basic research only, and B) exempt the NRI from the mandate that research projects be limited to those with a quantifiable economic benefit?

1) We fully agree that there is a need to conduct basic research. It is our intent that the National Research Initiative (NRI) be fully funded to support this type of effort. Our concerns are that some elements of the research portfolio lack a focus toward the economically significant challenges facing agriculture. NRI should be funded to provide a balance between basic and applied initiatives. In order to help assure that research is directed to the most relevant agricultural issues, user groups (such as commodity organizations representing producers) must continue to be closely involved in the priority setting process conducted by Federal agencies. This issue of the economic significance of issues needs to be an important component in the priorities setting process and would be reflected by relevance to a goal to which the project would potentially contribute.

2) The National Research Initiative (NRI) should not be limited to basic research only, although its primary focus should continue to be basic studies. We believe that the mission linked component of the NRI should continue to provide a vehicle for the integration of accomplishments from basic research directed toward solving contemporary economically significant problems. We agree that the majority of basic research projects should not be required to estimate an economic impact or return. However, it is still reasonable to expect basic research projects to effectively illustrate how these projects may eventually contribute to resolving current or future challenges facing agriculture. The NRI has been grossly underfunded and unable to meet all of the needs it was designed to meet, should the NRI be more adequately funded, the balance we are advocating may begin to exist. Mandated percentages for NRI supported basic versus mission-linked research are not necessary and could be counterproductive. In essence we are saying, we support the current balance of funding of the research continuum, however, we want to maintain a focus on relevance, which will enhance accountability, and we want to ensure that the basic research is consistent with these expectations.

J. Grant Brewer Answers to submitted questions

PROLOGUE

Prior to responding to the specific questions it is essential to define and explain the principles underlying the formation and continuing operational philosophy of the Biotechnology Research and Development Corporation (BRDC). BRDC was not created, nor is it managed, to be a funding source for basic and fundamental research. Instead, BRDC, through its private sector partners, is obligated to identify fundamental technologies that appear to offer promise, if appropriately developed, to contribute to the commercial and economic growth of the nation. This is achieved by utilizing the knowledge, perception, technology development capabilities and marketing skills of BRDC's private sector partners. BRDC and its private sector partners continuously seek out basic science that has passed the proof of concept test and offers the promise that, if properly developed, will address identified market opportunities and needs. In doing this BRDC addresses the growing problem arising out of the disparate objectives of publicly and privately sponsored research and development initiatives. Publicly sponsored research is skewed toward the discovery and understanding of new and basic scientific tenets whereas private funding is skewed toward commercial implementation with a growing gap between the two that represents early applications research. This is recognized as a needful problem as evidenced by the testimony of Dr. Peter Johnsen, USDA/ARS, on June 18th (see attached Exhibit A). BRDC is bridging that widening gap by funding the necessary evaluation and applications research that utilizes proven basic science to provide the early developmental groundwork for commercial implementation (see Exhibit B). An example of this was given in my testimony on June 18th.

Once the technology is developed to the point that it shows commercial promise BRDC transfers it, by licensing, to the private sector. BRDC's efficiency at performing this function is reflected in the statistic that it has generated one revenue producing license for every $1.2 million of Federal funds received.

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Answers to questions posed by Congressman Brown

#1

Question: "You state in your testimony (p.2) the BRDC is a privately owned, for profit corporation. According to the table you provided 68% of your funds come from public sources and 95% of the research funding is provided to Universities, ARS, and other Federal Research entities. It would seem more efficient for funds to be directly distributed from USDA to the Universities through a competitive grant program. It also appears more efficient for the $6.5 million in USDA ARS funds to be directly spent by ARS rather than having these pass through BRDC. What is the advantage of having federal funds distributed by BRDC rather than distributing them directly to Universities by USDA?

Answer: Competitive grant funds have traditionally been used to fund exploratory and basic research. BRDC's mission is to provide the resources for early-to mid-development of technology, that has been established as proof of concept, to commercial application. The purpose for doing this is to bridge the gap that exists between public funded exploratory/basic research and private sector funded commercial implementation of proven technology. For example, please refer to Exhibit A which is attached, which was presented in the testimony of Dr. Peter Johnsen of the ARS. In effect, BRDC's function is similar to that which is the intent of CRADAs, but in the BRDC instance, there is a more divergent corporate perspective and a greater sharing of the risk by the private sector partners than occurs in a one-on-one CRADA, as further explained in the answer to question #2. Competitive grant programs are far less efficient and goal oriented than BRDC funding strategies. If the goal of research is to eventually translate fundamental discoveries into commercial applications, BRDC's program is infinitely more efficient than a competitive grants program.

#2

Question: The list of licenses granted by BRDC includes a number of large, well established firms. Aren't these firms eligible to work with University and USDA researchers under cooperative research and development agreements? It appears from your table the public/private match of funding provided to BRDC is 72% public; 28% private. This is a more favorable public/private match than is required under CRADAs where the federal/corporate match is evenly split. Aside from the ability to do cooperative research at a lower match than is required under CRADAs what is the advantage of firms of working with BRDC?

Answer: Yes, these firms are eligible to work with University and USDA researches under CRADAs. As a point of clarification, however, USDA/ARS does not require corporate participants in CRADAs to provide matching, i.e. 50/50 sharing, funds in any form. When corporate partners do provide a match, it is generally in the form of in-kind research support. They are not required to provide cash payments. In the instance of BRDC, BRDC shareholders are required to make annual cash payments to BRDC for research. In addition, when promising technology is identified and transferred to a corporate partner, they then provide substantive in-kind development work, the cost of which is borne solely by the corporate participant. For example, to date Dow Chemical Company and its development partner have provided more than $1.5 million dollars in development work with respect to the biodegradable starch technology discussed in my June 18th testimony. Furthermore, all of BRDC's licensees have invested large sums of money in developing the licensed technologies for commercialization.

Even though the corporate match is higher working through BRDC, instead of dealing directly with University and USDA researchers, BRDC's corporate shareholders prefer to work through BRDC for a variety of reasons including the following:

A. The risks are shared amongst several participants.

B. BRDC negotiates and puts in place the legal documentation for the research program.

C. The often divergent commercial interests of BRDC shareholders offers the opportunity for broader application of the technology and the potential for synergy for commercial development.

#3

Question: How are the projects funded by BRDC selected?

Answer: Section B.4 of the Grant Agreement with ARS provides as follows:

"4. Assure That:

a. Projects to be supported by Grant funds provided by ARS to address these objectives are solicited through the issuance of Request for Proposals issued to the National Center for Agricultural Utilization Research, ARS/USDA, Peoria, Illinois; National Animal Disease Center, ARS/USDA, Ames, Iowa; other ARS/USDA research laboratories; and other research institutions.

b. Such projects are selected from the proposals submitted to and recommended by a qualified scientific advisory board composed of representatives from companies that are stockholders of BRDC and others as appropriate.

c. The financial management, property management, and procurement systems used in support of this Grant meet the standards found in Title 7 of the Code of Federal Regulations, Part 3015, Subpart U."

The BRDC scientific advisory board is composed of USDA/ARS representatives, shareholder representatives and when needed, consultants, who have expertise in the subject matter of the research project under consideration. The Board of Directors, based upon the recommendation of the scientific advisory board, makes the final decision on all research projects to fund.

#4

Question: Your table indicates BRDC received nearly $43 million in funding since its establishment 12 years ago, and that expenditures over this period equal over $36 million. Please explain the discrepancy of $6 million between these two figures.

Answer: BRDC's operational philosophy is based on generally accepted good business practices. Consequently, we always maintain a cash liquidity that is sufficient to meet our contractual obligations. Although BRDC currently has approximately $6.0 million in assets it also has contractual obligations for funded research into 1999. Unlike many agencies, we do not pay out, in advance, the full value of a contract. Instead, BRDC pays a three month advance and then reimburses on an actual invoiced expenses basis. This provides us the opportunity to monitor, and verify, that expenditures are being made in accordance to the terms of the contract, i.e., personnel funds are not being spent to purchase the latest widget for an instrument. In addition, BRDC's awarding of research contracts is cyclical and we will be awarding new contracts in October, 1997 that are estimated to be worth $5.0 million through the year 2000. This funding cycle is repeated annually and the value of new contracts is determined by the amount of unobligated cash on hand.

#5

Question: What proportion of the corporate participants in BRDC are small companies? It appears that 2% of BRDC's total research expenditures went to start-up companies. Assuming these firms have the smallest pool of capital resources available to them, why has BRDC not dedicated a larger proportion of expenditures on these companies?

Answer: One of six of BRDC's private sector shareholders is a start-up. It is Alexion Pharmaceuticals. BRDC is not allowed, per the terms of the USDA/ARS Grant to use Federal (public) funds to support research at private companies. Article B.4 states,

> "4. Assure that:
>
> a. Projects to be supported by Grant funds provided by ARS to address these objectives are solicited through the issuance of Request for Proposals issued to the National Center for Agricultural Utilization Research, ARS/USDA, Peoria, Illinois; National Animal Disease Center, ARS/USDA, Ames, Iowa; other ARS/USDA research laboratories; and other research institutions. (emphasis mine)
>
> b. Such projects are selected from the proposals submitted to and recommended by a qualified scientific advisory board composed of representatives from companies that are stockholders of BRDC and others as appropriate.
>
> c. The financial management, property management, and procurement systems used in support of this Grant meet the standards found in Title 7 of the Code of Federal Regulations, Part 3015, Subpart U."

The money that was spent supporting research at start-up companies was derived solely through shareholder contributions, and not Federal Grant funds.

#6

Question: What is your overhead for administering this program? In other words, for each dollar awarded for research, how many cents does it cost for you to administer the grant?

Answer: Section B.1 of the Grant Agreement provides as follows:

"B. ARDC agrees to:

1. Provide Management and clerical support personnel as needed to administer the Grant, with not more than 10% of the Grant funds being used for indirect costs either by ARDC or BRDC."

Any additional administrative costs must be paid from funds received from the private sector partners. BRDC's actual indirect costs, including legal fees for contract and license negotiations have been 19.5% from inception to date. This figure is less than half that charged by universities and other government contractors.

#7

Question: You noted that you had earned $1.59 million in "interest income" since the inception of the BRDC. What is the source of the principle on which that interest has been earned? How much of that principle was from the federal government?

Answer: Article C.3 of the ARS/ARDC Grant Agreement stipulates: "Payments received by ARDC from ARS are to be deposited into interest bearing accounts and any interest earned is to be treated as program income and used furtherance of the Grant. Program income and the uses thereof are to be reported upon in the reports specified in Paragraph B.6."

To date approximately $873,000 of interest on Federal funds has been accrued.

#8

Question: Of the research awards made by BRDC since its inception, how much funding has been awarded to federal government agencies?

Answer: The answer to this question is provided in Appendix A of my June 18th testimony. The total spent as of May 31, 1997 was $6,988,252. This figure does not include more than $1,000,000 of costs to provide non-government technical support at Federal facilities that is contracted through local universities.

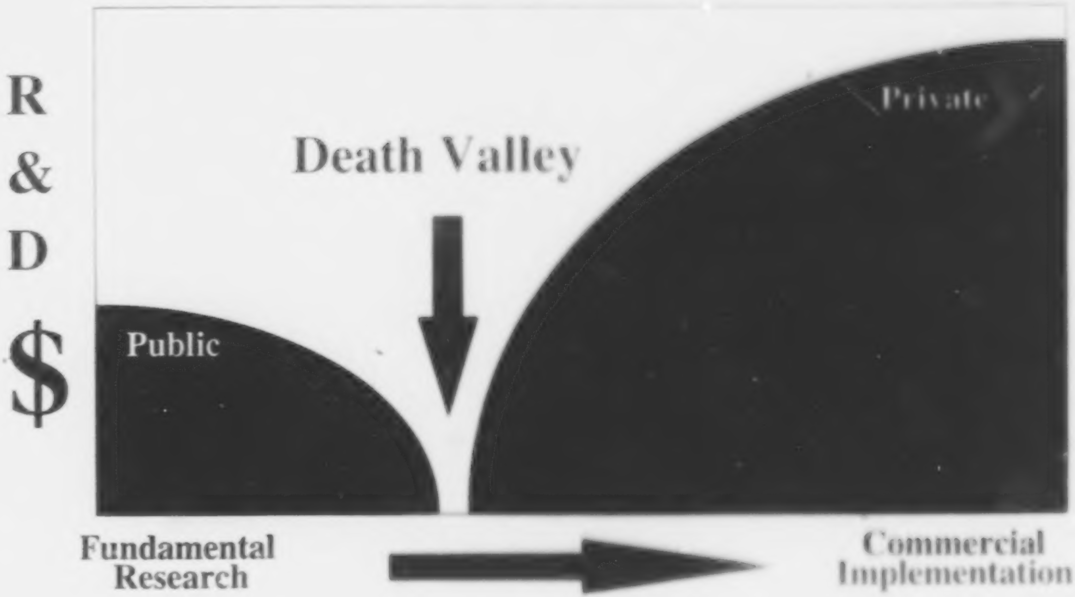
EXHIBIT B

	BRDC		PUBLIC		PRIVATE SECTOR
COMMERCIAL IMPLEMENTATION	0%		0%		40%
LATE STAGE DEVELOPMENT	10%		< 1%		25%
EARLY STAGE DEVELOPMENT AND SCALE UP	30%		10%		20%
APPLICATION TO COMMERCIAL OPPORTUNITIES	60%		10%		10%
EXPLORATORY/BASIC RESEARCH	10%		80%		5%

← RISK →

EXHIBIT A

Discovery to Market



25 CAST

The Science Source for Food,
Agricultural, and Environmental Issues

July 31, 1997

The Honorable Larry Combest, Chairman
The Honorable Calvin M. Dooley, Ranking Minority Member
Subcommittee on Forestry, Resource Conservation and Research
House Committee on Agriculture
Room 1301 Longworth Building
Washington, D.C. 20515

ATTN: Mr. Russell Laird, Subcommittee Staff Director, 1336 Longworth

Dear Congressmen Combest and Dooley:

Thank you for the opportunity to provide commentary regarding agricultural research, education, and extension programs. I am responding, on behalf of the Council for Agricultural Science and Technology (CAST), to the invitation letter dated July 8 from Congressmen Combest and Dooley. CAST is composed of 34 major food and agricultural professional and scientific societies whose members are employed by academic institutions, federal and state governments, and private industries. CAST's mission is (1) to identify food and fiber, environmental, and other agricultural issues; and (2) to interpret relevant scientific research information for legislators, regulators, the media, and others engaged in public policy decision making.

CAST submitted written testimony on October 20, 1995 regarding the 57 questions posed by the House Agricultural Committee. We also submitted written testimony on March 11, 1997 and oral testimony on March 13, 1997, both before the Senate Committee on Agriculture, Nutrition, and Forestry. Copies of these submissions are available on request.

Pursuant to the current request for input, I offer five suggestions relevant to the prioritizing of agricultural research funding:

1. Strengthen communication. Support legislation to develop a mechanism whereby the secretary of agriculture can communicate the importance of agricultural research, extension, and education to Congress and the public. In a land of plenty, it may be difficult to impress on the public the benefits of agricultural research, but such research is, most emphatically, not something that can be turned on and off like a switch. Major breakthroughs that we all enjoy often times have required years of exploratory research. The discontinuation of certain research programs may not be felt in the subsequent year or even in the following five years, but it will be felt eventually, and keenly.

   The United States and much of the world is fed, and our balance of payments significantly enhanced, by 1–2% of the U.S. voting public. Additionally, U.S. farmers long have been role models and trainers for farmers throughout the developing world. That the agricultural

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Council for Agricultural Science and Technology, 4420 West Lincoln Way, Ames, IA 50014-3447
(515) 292-2125, Fax: (515) 292-4512, Internet: cast@cast-science.org

enterprise is conducted by a very small minority of the population must not distract policymakers, who at times run the risk of being overwhelmed by much larger constituent groups. Given that populations are growing; environments are being degraded; land is being diverted from agricultural to urban, recreational, and other uses; and agriculture departments at land grant universities are being merged with environmental and human resource departments, it is imperative that agricultural research be funded generously so that the quality and quantity of food we have come to depend upon can be maintained.

Agricultural research (and by this term, I mean to denote food and fiber, agricultural, and environmental research) in the United States has led to improved health for its citizens, who spend a smaller percentage on food than do any other people in the world. If the benefits of agricultural research were understood clearly not only by Congress but also by the public, we suspect the continual struggle for research support would be unnecessary. Thus, we strongly encourage attempts on the part of the Department of Agriculture to communicate with Congress and the public. Such action does not dismiss the need for other organizations to continue their efforts to inform the public.

2. Strengthen partnerships. Neither the federal government nor private research should be expected to underwrite fully the complete spectrum of agricultural research. The land grant university system and colleges of agriculture have played a major role and should continue to do so. Agricultural research priorities have changed over time in the private, federal, and university systems. The W. K. Kellogg Foundation through its many food systems initiatives and programs is supporting efforts to re-engineer the land grant colleges of agriculture. The essential questions requiring response are as follows: (1) For today and tomorrow, what systems will best serve? (2) Are thorough re-engineering of both federal and university agricultural research institutions required? (3) What are the desired outcomes from agricultural research? And (4) who are the winners and who the losers of such research?

   Institutions have fared well in maintaining public support when they have broadened participation, been responsive to the changes in agriculture, and been receptive to new partnerships. It is clear that single powerful politicians or single commodity groups will not wield the power in the future that they have in the past. Future gains and support for agricultural research will result when potentially transforming partnerships include broad based support.

   Programs also are needed to promote and to fund integrated research among universities, industries, and trade associations. Leveraging government money to university/industry research projects is a highly efficient investment.

3. Strengthen coalitions. Encourage and endorse broad based coalitions facilitating consensus regarding research priorities. Examples of such coalitions are the FAIR '95 meeting of scientists, federal officials, trade association and industry representatives, consumer groups,

and media personnel interested in animal issues and research. This coalition was convened in October 1992 to reach consensus on research priorities for the 1995 Farm Bill. The process, which is being repeated in meetings to prepare for the next farm bill, is called FAIR 2002. Similarly, an array of organizations interested in plant research have formed a group called CROPS' 99, which has similar objectives. CAST recommends that these and other coalitions be as inclusive as possible.

The potential benefits of such coalitions are enormous. Producers can voice their major concerns and needs; consumer groups can bring their concerns to the table; trade associations can weigh in; scientists at public institutions, in industry, and the federal government can articulate what may be achievable through research; and the media can share realistic expectations with the public. The end result, a broad endorsement of support for research, we believe to be in the public interest.

4. Addressing emerging national and regional issues. The legislative and executive branches of the federal government are encouraged to consider the development of an effective mechanism to identify, prioritize, and support study of emerging issue such as genomics, foodborne pathogens, precision agriculture, hypoxia, endocrine disruptors, etc. As these and other emerging issues appear, an effective mechanism addressing them would benefit all citizens.

5. Promote sound science. Encourage the utilization of the best science, and develop policy supported by scientific consensus. Too often studies that do not stand up under peer review and whose results cannot be duplicated are described as "scientific." Obviously, differing designs and environments can produce different outcomes in specific instances. In this context, the value of organizations such as CAST, which utilizes volunteer scientists from many different disciplines to interpret the research carefully and to produce meaningful consensus, should be apparent. Strong research programs in agricultural colleges are vital to maintaining the application of sound science in agriculture for the public good.

I hope you will find these comments useful as you deliberate and carry out the challenging task of recommending where limited resources are to be directed in the wide sea of deserving researchable and educational areas.

Sincerely,

Richard E. Stuckey, Ph.D.
Executive Vice President

The cotton industry and related textile industries are of major importance to the U.S. economy. The U.S. cotton industry produces between 15 and 18 million bales of cotton each year (approximately 20% of the world's production), with typical annual market values between $4.0 and $6.5 billion as it leaves the approximately 30,000 farms that grow cotton in the U.S. The U.S. is a major exporter of cotton (U.S. exports represent approximately 25% of all cotton that enters world trade) and thus the U.S. cotton industry makes a significant positive contribution to the nation's trade balance. The cotton industry supports numerous input suppliers and a large marketing sector, providing employment for many more workers than those employed directly on cotton farms. The U.S. textile industry, which processes about 60% of the cotton grown in the country, employs 630,000 people, generates some $77 billion worth of products annually and exports more than $15 billion of these products each year.

Although the U.S. cotton industry is fundamentally strong at the moment, it faces potentially serious problems and challenges in both the short and long term. Maintaining and increasing cotton yields for farmers, in the face of foreign competition, threats from insects and disease, cost pressures, problems arising from limited water resources and problems arising from environmental concerns will be extremely difficult unless these problems are addressed in a well-integrated, multi-faceted approach. If this is not done, the U.S. cotton industry will have difficulty remaining healthy and vigorous. While private-sector research can be invaluable in attacking some of these difficulties, research contributions from university and government labs will also be required to solve problems of the scope and magnitude that are likely to face the cotton industry in the near future. Regrettably, cotton research in the public sector is fairly limited in scope. There are some isolated success stories, such as the cotton genetics/cotton breeding program at the U.S. Department of Agriculture (USDA)/Agricultural Research Service (ARS) laboratory in Stoneville, MS, the cotton cell biology/biochemistry and textile processing programs at the USDA/ARS center in New Orleans, LA and the cotton molecular biology program at the University of California at Davis, all of which carry out high-quality research on important topics. However, these efforts

Submitted by

Dr. David Knaff
Director, Institute for Biotechnology
Texas Tech University
Lubbock, Texas

tend to have a fairly narrow focus that cannot provide the broadly-based approach that will certainly be crucial to an optimally successful program.

The availability of a cotton research center that provides a coordinated and integrated approach to cotton research, at a single site, will be extremely beneficial to the U.S. cotton industry. This center will be particularly valuable if it carries out, coordinates and integrates cotton research in four fundamental areas: (1) Basic Cotton Biology, with an emphasis on genetic enhancement; (2) Optimization of Cotton Production; (3) Improvement of Fiber Testing and Textile Manufacturing and (4) Cotton Economics. Such a research center should have 40-50 active researchers, so that in-house expertise is available within all of the critical areas and sub-areas of modern cotton research. The presence of such a diverse expertise base at a single institution that is committed to encouraging direct, daily interactions between biologists working at the level of incorporating beneficial genes into cotton, agronomists working on lowering input costs and reducing environmental impacts, textile engineers developing new fiber testing techniques, and cotton pricing and marketing researchers working to improve price reporting and the tools available for analyzing domestic and international cotton markets will provide great advantages, when compared to separate facilities where researchers in different disciplines are isolated from one another. Given the needs to disseminate the results gained from this research and to train the next generations of cotton biologists, agronomists, textile engineers and market researchers, it makes sense to support this type of a facility when it is located at a major research university. The geographic location of such a central, modern research facility, staffed by researchers already familiar with cotton and designed to encourage synergistic interactions, is also of great importance. When one considers the need for constant input from and consultation with, cotton producers, ginners and seed suppliers and also takes into account the importance of outreach programs that will provide opportunities for community economic development and technology transfer to the private sector, the need to locate this multi-faceted research facility in a major cotton-producing and cotton marketing region becomes obvious.

While research on a plant as complex as cotton most necessarily include focusing on some projects with a long time frame, work at the center should focus on projects where progress can be expected and where preliminary studies offer good reason to be optimistic about continued future progress. If this is the case, any federal support for research at such a cotton research center will be using the taxpayers' money efficiently and wisely. Among the areas in which an enhanced cotton research efforts are most likely to produce results, are the following - In the area of genetic enhancement of cotton, progress can be expected in improving resistance to pests (such as the boll weevil) and disease, improving the quality of both fiber and oil, improving seedling establishment, increasing tolerance to cold, heat and drought and increasing yield. In the area of cotton optimization, an increased research effort is likely to yield significant progress in improving water use efficiency, providing a more rational way to deal with climatic adaptation, lowering unfavorable environmental impacts, and lowering input costs through techniques such as precision agriculture. In the area of fiber testing and textile manufacturing, research in new measuring techniques that will allow successful exploitation of fiber properties and elimination of fiber contaminants appears very promising, as does research designed to develop cotton products for new markets. Research into ways in which economic feasibility and market impact studies can be improved and by which the U.S. and international cotton markets can be analyzed are also likely to produce a many-fold higher economic benefit to the industry than the cost of doing the research. It would thus make sense to locate a multidisciplinary cotton research center at an institution that already possesses demonstrated expertise in these areas.

Securing the Food Safety and Sustainability of the Wheat and Barley Industries in the North Central Region of the United States.

A Cooperative Project

SUBMITTED BY MR. TOM ANDERSON

Fusarium blight, generally known as "scab", has emerged in recent years as an industry-threatening disease for all classes of wheat and barley in the United States. This proposal describes a comprehensive, collaborative project that synergistically harnesses and directs the research capacities of twelve Land Grant Universities in or adjacent to the north-central region (Kentucky, New York, Michigan, Minnesota, Indiana, North Dakota, South Dakota, Kansas, Nebraska, Illinois, Missouri, and Ohio). New, collaborative and multi-state activities designed to directly benefit all participants are proposed. Those activities will be complemented by strategic investments throughout the region to amplify and strengthen ongoing efforts aimed at understanding and combating this threat to America's agriculture, economy, and food safety.

I. Problem Statement

Scab is a disease of wheat and barley caused by *Fusarium graminearum* and related fungi. The effects of scab are most obviously manifested as reduced farm yield, lowered test weights, and reduced grain quality. Economic losses of this type were extraordinary in recent years. Across North Dakota, Minnesota, and South Dakota, yield and grain quality losses approached one billion dollars in 1993 and ranged from 200-400 million dollars across the region in subsequent years. Losses were in excess of 300 million dollars in Ohio, Michigan, Indiana, and Illinois in 1995 and 1996. Those facts are themselves alarming, but the problem is amplified to the level of a strategic threat because scab infected grain is usually contaminated with "vomitoxin" (deoxynivalenol), a toxic metabolite produced when the fungal pathogen invades the developing kernel. Vomitoxin-contaminated wheat and barley has recently been greatly devalued by the U.S. marketing system. Because of a near zero tolerance policy, grain buyers refused to purchase any soft white wheat from Michigan in 1996 or malting barley from North Dakota. Several important international markets are poised to impose restrictions on vomitoxin levels that could result in continuing serious losses for U.S. producers.

Amelioration of scab as a threat to the producers and consumers of wheat and barley has proved to be one of the more intractable problems encountered in the era of modern agricultural science. Adequate genetic or chemical solutions have proven elusive. However, significant progress is evident in both those arenas. Unchecked, scab represents a profound threat to the economic and food safety environment of the United States. In Ohio, Indiana, Michigan, Illinois, Missouri, eastern Nebraska, as well as other soft wheat producing areas, scab could conceivably eliminate wheat as a viable component of cropping systems. This would have immediate, short-term implications for the well-developed wheat-based milling and food processing industries in those regions. In the long run, the reduction in landscape diversity and increases in soil erosion associated with the demise of wheat will in turn have severe negative consequences on the sustainability of our food production capacity. In the hard wheat production regions of the mid-west U.S., where wheat dominates the landscape, scab threatens the very fabric of America's rural economy. Barley production has already been either threatened or eliminated in areas of the upper mid-west where brewers have imposed near zero tolerance limits for vomitoxin in grain.

There is a strong consensus among the institutions collaborating in this proposal that the complexity and seriousness of this problem necessitates a concerted, regional effort. Action is urgently needed. Our food safety-conscious society and associated industries have shown a pronounced propensity to reject foodstuffs that carry connotations of health risks, real or perceived. The research and communication agendas proposed here are the result of a recent meeting of scientists from the states represented by this proposal.

II. Research Needs

Food Safety and Post-Harvest Management of Grain: Efficient and accurate monitoring of grain for vomitoxin contamination requires resolution of new sampling and testing protocols to prevent food safety problems. Commercially viable technologies for the safe and economically maximized handling of vomitoxin contaminated grain require development and dissemination. These may be based on separation, dilution, or detoxification approaches.

Plant Breeding. Conventional and Molecular Approaches to Variety Development and Germplasm Enhancement: The ideal solution to all facets of this problem is the development of wheat and barley varieties that are genetically configured to preclude scab development. Creation of an integrated network of scientists working to identify and evaluate all possible sources of resistance is a critical need. A few genes that impart partial resistance have been identified, but it is very likely that more exist. World germplasm collections, including the World Small Grains Collections maintained by the United States Department of Agriculture in Aberdeen, ID, have not been systematically evaluated for scab resistance. Effective, large-scale screening techniques are also needed to facilitate the incorporation of identified resistance genes into adapted wheat lines. Screening breeding materials ensures that the most susceptible varieties of those currently grown are eliminated from production. Ironically, the lack of uniformity of natural infections forces scientists to employ artificial inoculation techniques. Resolution and distribution of expert knowledge on this aspect of germplasm screening is critical. Employment of molecular techniques to accelerate plant breeding, provide basic information on the host-pathogen interactions, and as a possible source of novel, engineered resistance genes is a prime candidate for fruitful investment.

Epidemiology and Crop Management: The causal organism of wheat and barley scab has a diverse array of plant species on which it can thrive, including corn. Consequently, there is a wide range of sources of the pathogen each year. The occurrence of scab in wheat and barley is probably affected by the management strategies employed throughout a farm or region. However, a full understanding of the epidemiology of scab is yet to be resolved. What is the primary source of inoculum for the annual epidemics in wheat and barley? Are there management strategies that can lessen the risk of scab occurrence? Are there unidentified chemical control strategies? What combination of physical and biological conditions lead to scab epidemics? Can that information be used to predict scab epidemics?

Communication Networks: The scab problem is multi-disciplinary from a scientific perspective, and multi-sectored from an agriculture industry perspective. Proactive efforts aimed at concentration, integration, and dissemination of research, extension, and outreach-oriented information will return large benefits to the overall system.

III. Proposed Approaches and Research Emphases

1) **Core multi-state research and outreach activities.**
   a) *Food Safety and Post-Harvest Management Research Network.*
   Appropriate management of scab infected grain requires reproducible and properly administered vomitoxin testing systems. Milling and food processing techniques that render vomitoxin-contaminated grain safe will be explored. The toxicological properties of vomitoxin will be investigated.
   b) *Regional Advanced Breeding Material Evaluation Nursery System.*
   All states will cooperate as evaluation sites. Two states will provide coordination of seed distribution and data summarization activities. Standardization of data collection and summarization techniques will maximize impact. Each state will benefit from collection of more evaluation data than achievable by a single breeding program operating alone.
   c) *Germplasm Introduction and Evaluation System.*
   There will be two coordinating centers, one in the spring wheat region, and one in the winter wheat region. This system will ensure that plant breeders are afforded access to all possible sources of favorable genes. There is no such system in place for scab or any other breeding objective for wheat in the U.S.
   d) *Fungicide Application Technology Research Network.*
   Development and deployment of alternative spray systems may boost the effectiveness of available fungicides. Alternative fungicide formulations may also provide effective control. Effective chemical control strategies, if developed, would provide relief for producers until new resistant wheat and barley varieties are available.
   e) *Research and Outreach Information Network.*
   Sponsorship and enhancement of the pre-existing annual Scab Forum and NCR-184 committee activities coupled with full exploitation of the "information highway" will maximize information exchange among scientists, thereby preventing unnecessary duplication of efforts. Integrated access via Internet technologies to extension and outreach information will not only economize efforts in that area but also ensure uniformity of the "message."

2) **Activities and research emphases to be implemented within each state.**
   a) *Strengthening and expansion of ongoing plant breeding efforts.*
   Plant breeding programs targeting scab resistance are ongoing in all collaborating states. However, these efforts are hampered by an inadequacy of funds. Actual

investments of funds requested here will depend on each state's strengths and needs. All information on techniques, including artificial inoculation and molecular approaches, will be shared via the information network described above.

b) *Expansion and integration of scab epidemiology and crop management research.* Knowledge of the exact physical and biological conditions required for epidemics to occur will be examined and the findings applied to creation of forecasting systems. The actual mechanisms of infection and the sources of inoculum will be identified. Knowledge of the impact of same-field and regional farm management practices will be expanded.

The management and control of scab is a research area that will require sustained investment for an extended period of time. Rapid technological and informational developments are fully expected. The top-level management entity for the project will be a committee comprised of the Director's of the Agricultural Experiment Stations from each of the cooperating states. The initial annual budget request of $5,125,000 is detailed in Table 1. Funding of this magnitude is needed annually for a five year period.

IV. Benefits and Justification.

The health of our country's agricultural and therefore national economy continues to rely heavily on only a handful of crop species. Two of the critical crops for the United States are wheat and barley. Scab represents a serious, strategic threat to the wheat and barley industries in much of the United States. This proposal outlines a unique, large-scale cooperative effort developed at the scientific grass-roots level by plant pathologists, breeders, food scientists, and agronomists. It seeks to provide local flexibility within a firm framework of cooperatively identified and executed activities. Scab falls in the unique category of scientific challenges where neither existing public funding mechanisms, nor private investments are adequate to counter the threats posed. Current investments aimed at the scab problem at the Universities represented here total more than several million dollars per year. The regional integration and synergism that will stem from successful implementation of this project will amplify dramatically the impact of that ongoing investment.

Table 1. Annual budget.[1]

Activity	Annual Budget
Food Safety and Post-Harvest Management Research Network	$1,000,000
Strengthening and Expansion of Ongoing Plant Breeding Efforts: Conventional and Molecular Approaches to Variety Development and Germplasm Enhancement	$2,500,000
Regional Advanced Breeding Material Evaluation Nursery System	$112,500
Fungicide Application Technology Research Network	$375,000
Germplasm Introduction and Evaluation System	$200,000
Expansion and Integration of Scab Epidemiology and Crop Management Research	$800,000
Project Coordination and Research and Outreach Information Network	$137,500
Annual Total	**$5,125,000**

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[1] The Directors of the Agricultural Experiment Stations of the ten cooperating states will coordinate budget allocation to individual states.

Agricultural Retailers Association

Mr. Chairman and members of the Subcommittee on Forestry, Resource Conservation, and Research, my name is Paul E. Kindinger, President/CEO of the Agricultural Retailers Association. On behalf of the members of ARA, I appreciate the opportunity to respond to your invitation to submit a formal statement with respect to the Committee's consideration of reauthorization of agricultural research, education and extension programs.

ARA has over 1,200 member companies who are primarily plant nutrient and crop protection retail farm suppliers in over 8,500 locations across the country. In addition to providing plant nutrients and crop protection materials to farmers, our members provide agronomic, environmental and technical services to ensure proper nutrient and crop protection management. Moreover, many of our members also offer other farm inputs such as seed, feed, and petroleum products.

Retailers are uniquely positioned to have first hand experience in being both a provider and recipient of the many benefits that have been conferred through the efforts of our nation's agricultural research, extension, and education programs. The advances in plant breeding, along with continuing research in improved fertilizer and pesticide applications, integrated pest management, and other technologies, have resulted in sustained increases in yields on major field crops. At the same time, research has resulted in many natural resource technologies such as conservation tillage, crop rotations, cover crops, soil testing, etc. As a result, ag research has played a major role in reducing the economic and environmental costs of producing food and fiber. Consumers have been the major beneficiary with affordable, abundant, high quality food and fiber products.

Agriculture is currently experiencing the initial impacts of two emerging and dynamic technologies--biotechnology and site-specific or precision agriculture. Genetically engineered crops that promote improved insect and disease resistance are already in commercial use. Other areas of potential growth are traits that will improve drought resistance, prolong shelf life, and result in better nutritional quality.

Site-specific agriculture utilizes a combination of extensive soil sampling, geographic digitized field mapping, variable rate and blend application, yield monitoring, and other technologies to tailor plant nutrients and crop protection inputs to individual sites of a field according to specific soil characteristics. These site-specific practices have a high potential to further increase productivity and competitiveness of the agricultural sector in the global marketplace as well as improving our natural resource base and enhancing the safety and quality of our nation's food supply.

Federally-supported ag research focused on long-term projects of national priority, coupled with private sector research and development focused on product development, will continue to be the driving force in allowing the agricultural sector to meet the long term challenges of achieving long-term sustainability and profitability and respond to broad public concerns for safe, nutritious and accessible foods.

Ag Research Structure Must be More Responsive to Meet Agriculture's Challenges

Meeting agriculture's long-term challenges will require even faster development of technologies to increase the sector's productivity and continue to protect the environment. There is a consensus that the world's population will grow to possibly 9 billion people in the next 30-40 years requiring an increase in farm output of as much as 3 times our current level. Meeting that demand will require that the U.S. have a major role in fulfilling those requirements. However, this increased output cannot be achieved by destroying rain forests and other wildlife habitat for crop production. Rather, technologies of all types must be expanded to further increased farm productivity per acre on existing cropland.

Ag research, along with its extension and education functions, must be reformed to meet these challenges in a timely fashion. Moreover, ag research must reorient its priority setting process to address a compelling problem facing the agricultural sector: the establishment of increased regulatory requirements without adequate scientific basis or economic assessment of the direct or indirect impacts a specific regulatory requirement will have on agriculture, the rural community, or consumers.

A case in point is the recent EPA promulgation of expanded ozone and particulate matter standards. The House Agriculture Committee, in a May 9 letter to EPA Administrator Carol Browner raised serious concerns with data in the proposed rule related to agriculture and stated that "Adequate research has not been conducted to determine if these standards are achievable through best available control measures." In formal comments to EPA, numerous farm, commodity and agri-business organizations, including ARA, registered critical concerns about the lack of adequate research to determine the direct and indirect impacts of these standards.

A related issue is the ongoing negotiations of the United Nations framework convention on climate change (Global Climate Treaty). This treaty establishes mandatory, enforceable caps on greenhouse gas (carbon dioxide, methane and nitrous oxide) emissions. U.S. agriculture is blamed for about one-third of the total U.S. greenhouse gas emissions. As a result, the treaty will have major impacts on crop and livestock production practices and fuel costs. Most important, the treaty will put U.S. agricultural producers at a serious disadvantage in world trade, since controls would apply only to the U.S. and other developed countries. A Senate Resolution (Sres 98) which has over 60 cosponsors, raises strong concerns with the treaty and requests the Clinton Administration provide a complete economic analysis, including any specific controls which may be imposed on agriculture.

The recently passed Food Quality Protection Act requires major changes in pesticide regulation that demands greater health and environmental protection. Among the new requirements include: use of an extra 10-fold safety factor with respect to pesticide exposure and toxicity to infants and children; aggregate exposure from all non-occupational sources; effects of cumulative exposure to a pesticide and other substances with common mechanisms of toxicity; effects of in utero , and the potential for endocrine disrupting effects.

EPA, in its March 1997 Implementation Plan, acknowledged that incorporating these factors into the tolerance setting process poses a challenge, in light of the many scientific uncertainties about how best to address them in risk assessment. As a result, the agency has adopted an interim strategy to meet the new risk assessment requirements of FQPA by using public health protective scientific judgments and interim assessment practices when complete data are lacking.

These examples are just a few of the many areas of public policy that are having a major impact on agriculture and will result in measures imposed on the sector without adequate scientific research to identify whether such regulatory requirements are in fact necessary, let alone the major impacts they will have on the agricultural community.

Recommendations for Ag Research Reform

Adequate measures must be put in place that will provide an **"early warning" mechanism in the priority setting process** of federally funded agricultural research that will trigger the necessary resources to address these and upcoming challenges in a timely manner. The benefits of biotechnology, for example, will mean little to production agriculture if they are otherwise constrained by pollution control measures or if fuel costs are raised significantly to meet emission caps or reductions. It is incumbent that our agricultural research structure be in a position to provide the basic research that is needed to meet legitimate public policies and concerns before they become public policy headaches.

An essential element in the priority setting process is **stakeholder involvement**. While the 1996 Farm Bill replaced existing advisory groups and established the National Advisory Research, Extension and Education Advisory Board, it is uncertain that this new entity will be able to adequately capture input from all affected parties in establishing national research priorities for federally funded research, as well providing guidance on the direction of Extension and Education. Stakeholder advisory groups could assist the National Board in determining what should be the relevant federal research priorities as well as offer input on ways to improve the existing institutional structure supporting agricultural research, education and extension programs.

In addition to providing a more responsive priority setting process on existing and emerging challenges, **more funding is needed to adequately meet these challenges**. The current $1.8 billion funding level has remained static for several years and pales in comparison to research budgets for Defense ($35 billion) and Health ($12 billion). Agriculture recognized the need to rid itself of self-defeating supply management policies and place greater reliance on the marketplace, and in effect, take on more of the risk. In exchange for that additional risk, however, adequate agricultural research and education, along with removing trade barriers to world markets is necessary if agriculture is to remain productive and maintain long-term profitability. Adequate funding is imperative if we are to continue to build and improve our research and technology transfer system in the U.S.

ARA would also support the **development and promotion of site-specific or precision agriculture technologies as a priority of agricultural research.** While various aspects of these technologies are already in commercial use, research is needed to better understand and manage the interrelationships of crops with the soil, water, air, pests and other organisms on specific sites within a field. Moreover, dissemination of these research results must be in a manner that is timely and usable for retailers and producers. We would also support the development of training and education programs for retailers, producers and others involved in ag production and the transfer of site-specific technologies. Finally, the development and promotion of federal agricultural research on site-specific technologies should not conflict with existing private/public site-specific research and promotion efforts. To that end, ARA supports the principles embodied in H.R. 725, the Precision Agriculture, Research, Education and Information Dissemination Act introduced earlier this year.

Summary

While federally funded agricultural research and extension have provided immense contributions to agriculture, and ultimately to consumers, the priority setting process must be improved to address the regulatory challenges facing the agricultural sector. An accountability system should be an integral part of the priority setting process that will ensure that the research and extension activities will have clear goals and outcomes to fully address priority issues. Stakeholder input through advisory groups or alternative informal activities is key to ensure that the nation's agricultural research, extension, and education programs will meet the need to help provide long-term sustainability of U.S. agriculture and be responsive to broad public policy concerns.

Again, thank you for opportunity to provide our views.

Alliance for Continuing Nutrition Research and Monitoring

Mr. Chairman and other members of the Subcommittee, thank you for allowing the **Alliance for Continuing Nutrition Research and Monitoring** the opportunity to submit this testimony to this Subcommittee. The alliance consists of 11 groups representing farmers, health professionals, physicians, scientists, food technologists, educators, and food manufacturers. The alliance is a diverse constituency of approximately 15 million individuals, and is united in its support of human nutrition research and monitoring. The true tally of supporters could include the entire population because everyone gains from the valuable contributions of human nutrition research, as we illustrate in our testimony. I am Nancy Chapman, a public health nutritionist, member, and volunteer of several of the groups represented here today. I have used the health and dietary information from the federal surveys and the findings of federal nutrition research throughout my professional career as an evaluator, educator, policy analyst, and communicator.

Congressman Combest, you have long been a champion of agriculture research and recognize that the advances in agriculture, as well as human health, depend in large measure on high quality research, conducted in both public and private institutions. This Alliance wants to describe to you and your esteemed colleagues the numerous junctures among animal/plant science, human nutrition research, agriculture production and human health. We want you to envision nutrition research along with food science, agricultural biotechnology, and other research fitting together as a train moving agriculture more quickly, smoothly, and efficiently down the competitive track in a global economy. Human nutrition research and monitoring help:

- focus federal food assistance programs where they are most needed;
- health professionals to devise strategies to lower the risk of heart disease, cancer, diabetes, osteoporosis, and other diet-related diseases by increasing the understanding of specific relationships among diet, heredity, and lifestyle;
- reduce health care costs due to lower incidence of chronic diseases;
- generate a more nutritious food supply by identifying health-promoting properties of plant and animal foods in a balanced diet;
- identify public health problems that can be corrected through changes in food supply such as nutrient fortification, fat reduction, and interventions to prevent obesity;
- keep dietary guidance current and appropriate for nutritionally-vulnerable groups from infancy to old age to realize full growth, development, health, and physical well-being; and
- provide data for estimating possible intake of incidental contaminants, pesticides, and naturally occurring toxic substances as part of regulating the use of certain substances.

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RETURN ON INVESTMENT

Conservatively, the approximate $60 million investment in USDA nutrition research and monitoring guides over $40 billion in food assistance expenditures. The federal investment in USDA research has also guided the well-known nutrition labeling program and the USDA/DHHS *Dietary Guidelines for Americans*. Research also guides the nutrition education programs in schools, preschools, hospitals, and elderly feeding programs as well as such public campaigns as, *Five-A-Day for Better Health*. These and other nutrition education programs have the potential for reducing some of the $200 billion annual costs for treatment and care of diseases linked strongly to nutrition, such as cardiovascular diseases, high blood pressure, diabetes, cancer, obesity, and osteoporosis. Virtually all major chronicle and degenerative diseases are linked to nutrition. This will become increasingly important as our country's population ages.

REQUEST FOR CONGRESSIONAL SUPPORT

Because the federal government receives an excellent return on its investment in human nutrition research and monitoring, the Alliance for Continuing Nutrition Research and Monitoring believes Congress should readily support three core elements of nutrition research and monitoring. These requests mirror the President's Human Nutrition Initiative in the USDA budget and are as follows:

1. Maintain a comprehensive nutrition monitoring system that harmonizes the health research of the National Health and Nutrition Examination Survey (NHANES) and the dietary data from the Continuing Survey of Food Intakes by Individuals (CSFII) without losing essential components of either survey. The President's budget includes additional $6 million of funding to determine the food consumption of infants and children that will enable better estimates of dietary exposure in reassessment of pesticides under the 1996 Food Quality Protection Act.
2. Provide measures and support that assures updating and reporting nutritional status, food consumption and composition data in a timely manner that reflects advances in technologies and plant and animal breeding. Accurate nutrient data information available from industry, commodity groups, and other private sources, often developed for nutritional labeling, should be incorporated into databases to portray the new products in the market place.
3. Allocate sufficient funding to support basic human nutrition research at USDA. The President's budget requests an additional $6 million dollars of funding for USDA nutrition research to meet the challenges of the new century.

A COMPREHENSIVE NUTRITION MONITORING SYSTEM, ITS TIME HAS COME

Congress passed the National Nutrition Monitoring and Related Research Act of 1990 with the expectation that the existing NHANES and CSFII surveys would be well-coordinated in data collection, analyses, and reporting. This goal has not been achieved. It is time for Congress to restate the expectation that USDA and DHHS closely collaborate to establish a comprehensive nutrition monitoring system that provides timely and pertinent data on food and nutrient intakes, health indicators, and socio-demographics. Requisite funds for such a system are justified given the extensive use of the data for directing federal food assistance expenditures, public health programs, pesticide registrations, food labeling, dietary guidance, food additive evaluations, and developments of new products, seeds, and breeds. For example,

- Food consumption data underpins the Thrifty Food Plan (TFP) on which the food stamp benefit levels are based.
- Survey data are used by programs such as the Supplemental Food Assistance Program for Women, Infants, and Children (WIC) in determining what nutrients and foods should be targeted in the WIC food package for recipients; data are also used to determine the size of the potential WIC population.

An additional $6 million of funding has been requested by the President to survey infants and children's food consumption to better estimate nutritional risk, exposure to environmental contaminants, and dietary exposure to pesticides and other substances for purposes of registering and reassessing a product. This supplement in the budget is critical in light of EPA's review of pest control substances under the Food Quality and Protection Act.

FOOD COMPOSITION DATA MUST REFLECT THE CURRENT FOOD SUPPLY

USDA and DHHS have progressed in revising and maintaining food composition tables to analyze the food consumption data from NHANES and CSFII, however, much more is necessary to make the nutrient database more efficient and effective. With the rapid advancements in technology to lower fat, sodium, and calories in foods, estimates of food and nutrient intakes would be rendered inaccurate if food composition databases are not kept current. Forming partnerships with the food industry and commodity groups would permit updating databases, using information developed for nutrition labeling or similar purposes.

NUTRITION RESEARCH HAS AN IMPORTANT ROLE IN USDA

In previous legislation on agriculture research, Congress established USDA as the Federal government's lead agency for human nutrition research and recommended developing national human nutrition research centers. With health care costs rising, this is a great time to invest in USDA nutrition research grants to attract the best investigators to explore tomorrow's health challenges.

The unique combination of disciplines, cross fertilization of research projects, and varied cluster of talented researchers can produce the next major steps to improving diets and maintaining health.

USDA funding of the six Agriculture Research Service (ARS) laboratories and competitive grants has led to many breakthroughs in human nutritional science. But our overall knowledge of nutrition fails to keep up with emerging information about how the brain develops, how the immune system resists infectious disease and fights off foodborne illness, and how the body ages. Additional funding for USDA nutrition research will advance our understanding of critical changes that need to be made in our food supply, dietary advice, gene/nutrient interactions, plant and animal composition, and public health programs to keep our nation healthy and economically competitive.

Let me share just a few breakthroughs that illustrate where USDA Nutrition Research is advancing a critical knowledge base. Improved protein profiles of beans and grains to advance human growth and development makes these commodities more desirable in heart healthy diets and in emerging economies. An ARS developed product known as Oatrim, which received a lot of press recently, is a high fiber fat substitute which improves glucose tolerance, lowers blood lipid levels, and produces weight loss, subsequently preventing some forms of heart disease. The ARS Carotenoid Research Unit in Beltsville is currently involved in leading research on carotenoids. New research showing tumor control in animals fed certain plants may hold promise for humans. Recent studies suggest plants such as soybeans, fruits, and vegetables naturally contain substances such as phytoestrogens that may lower cholesterol, halt or perhaps prevent tumor growth, or retard osteoporosis. Studies have also shown a positive effect of trace elements (or constituents) on disease prevention such as folic acid and neural tube defects, chromium and diabetes, selenium and cancer, and copper and heart disease.

ROLE OF PRIVATE SECTOR IN ADVANCING HUMAN NUTRITION RESEARCH AND MONITORING

Alliance members have supported basic nutrition research and clinical trials, conducted food and nutrition research and surveyed consumers about dietary and health behaviors. We all agree that the federal government must maintain the primary responsibility for gathering comprehensive data on all population groups and building the foundation of fundamental nutrition research.

In turn, health, nutrition, commodity, and food industry groups have invested in food and nutrition research that expands knowledge, but usually in a direction commensurate with an institutional mission. Examples of alliance members' investment in nutrition, food and consumer research include:

- since 1995, $861,000 has been spent on investigating the role of soy protein and phytoestrogens in fighting cancer;
- $600,000 per year to assess the role of dietary cholesterol on health;

- $2 million annually for food safety, nutrition and consumer education programs;
- almost $40 million in research in diet, nutrition and cancer prevention and treatment;
- more than $2 million over the past 5 years to conduct observational and intervention studies of the impact of infant feeding practices on growth and health outcomes in early childhood, and nutrient bioavailability from weaning foods; and
- several studies tracking eating behaviors and nutrition knowledge of adults and children.

CONCLUSION

Congressmen, you face difficult decisions about how to set priorities for agriculture research dollars. The practical public and private uses of the data from nutrition research and monitoring efforts at USDA, outlined in our testimony, are clear evidence that these programs warrant your continued support. The Alliance wants you to view nutrition research as a safeguard on federal expenditures. For every $1 spent on USDA nutritional research, we assure that $570 of federal funds allocated for USDA food assistance programs are spent wisely. Factoring in the various ways the USDA nutrition research and monitoring data are applied, this multiplier would be astronomical.

We thank you for giving the alliance a voice to explain the significant benefits of nutritional research to agriculture and the public well-being.

JUN 25 1997

AASCARR

American Association of State Colleges of Agriculture
and Renewable Resources

June 16, 1997

The Honorable Larry Combest
United States House of Representatives
Washington, DC 20515

Dear Representative Combest:

I am writing to you on behalf of the American Association of State Colleges of Agriculture and Renewable Resources (AASCARR) to elicit your support for reauthorization of funding for agricultural higher education programs. AASCARR is a national organization made up of institutional membership of more than 50 public, non-land-grant universities in many states. These schools offer baccalaureate degree programs in the food, agricultural and renewable natural resource sciences. Many of the AASCARR schools also offer graduate degrees and are involved in research. AASCARR is affiliated with the American Association of State Colleges and Universities.

AASCARR supports the following:

1. **USDA Higher Education Programs.** We want to see increased appropriations for the Challenge Grant Program. Currently, programs to improve the educational system for agricultural students receive a very small portion of the USDA budget. However, the end product, better educated graduates, has far reaching impact. It is our goal to see the funding for this program reach a minimum level of $7 million annually.

2. **National Research Initiative.** We ask that NRI be funded at the full $500 million. This amount will encourage more multi-disciplinary and multi-institutional cooperation. Part of the fund should be made available to support research to develop solutions to regional or national problems in the food, agriculture and national resource system.

3. **Success of Smaller Universities.** Earmarking a portion of available grant funding for smaller universities is a valid means of fostering expertise. Currently, smaller universities tend to be less successful than the larger universities in the competitive grant process, even though they may have qualified, productive scientists.

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4. **Extension**. We recommend that extension service initiatives be made available on a competitive basis to non-land-grant universities in addition to the land-grant universities. Our position is that of the National Research Council in their 1996 report, Colleges of Agriculture at the Grant Universities. As budgets for extension have fallen in some states, clients have increased their requests to the non-land-grant institutions for assistance. In these areas, we are missing an excellent opportunity to deliver service at a lower cost by using the human resources of the more geographically dispersed non-land-grants. It is our hope that the existing work of extension not be disrupted to achieve equity in funding. We hope that additional funding of a sufficient amount be made available to support the productive efforts of these additional universities.

5. **Priority setting**. The National Agricultural Research, Extension, Education and Economics Advisory Board should be expanded to include representation from a non-land-grant institution. At the present time, non-land-grant universities have no voice in setting priorities for research, education and extension yet they enroll and graduate a substantial number of students each year.

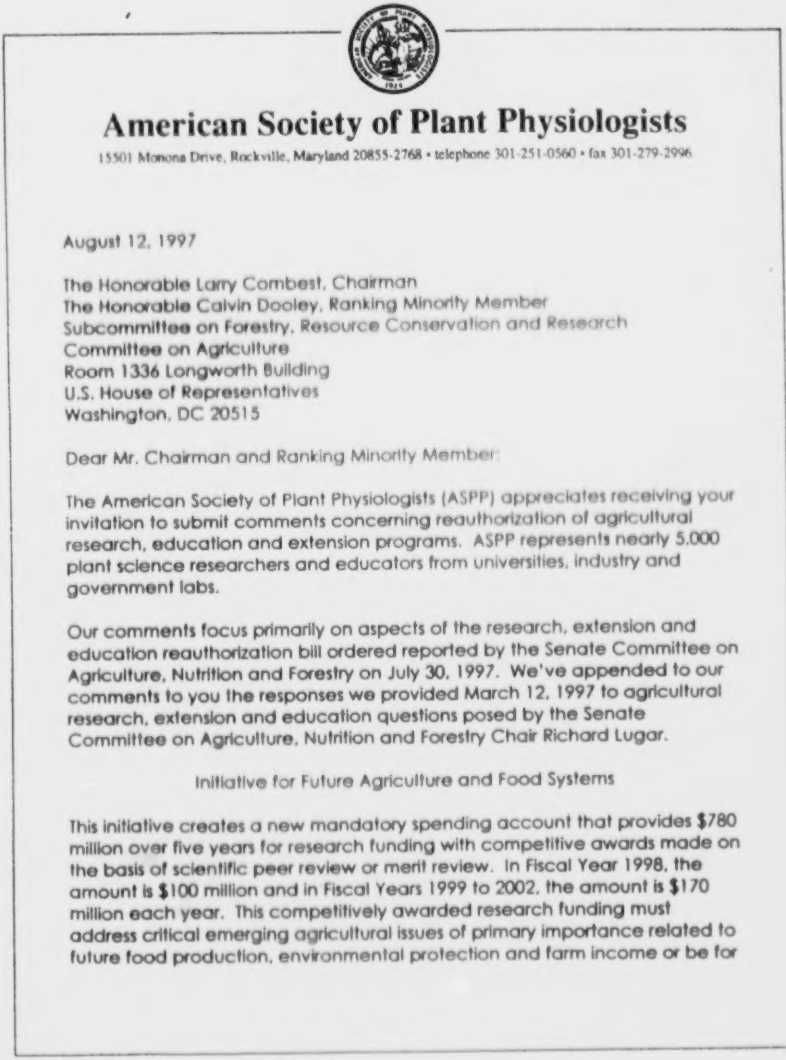
If I can provide any additional information, please feel free to contact me.

Sincerely,

JRClark

James R. Clark, Ph.D.
Treasurer, AASCARR

JRC/bp



American Society of Plant Physiologists
15501 Monona Drive, Rockville, Maryland 20855-2768 • telephone 301-251-0560 • fax 301-279-2996

August 12, 1997

The Honorable Larry Combest, Chairman
The Honorable Calvin Dooley, Ranking Minority Member
Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
Room 1336 Longworth Building
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman and Ranking Minority Member:

The American Society of Plant Physiologists (ASPP) appreciates receiving your invitation to submit comments concerning reauthorization of agricultural research, education and extension programs. ASPP represents nearly 5,000 plant science researchers and educators from universities, industry and government labs.

Our comments focus primarily on aspects of the research, extension and education reauthorization bill ordered reported by the Senate Committee on Agriculture, Nutrition and Forestry on July 30, 1997. We've appended to our comments to you the responses we provided March 12, 1997 to agricultural research, extension and education questions posed by the Senate Committee on Agriculture, Nutrition and Forestry Chair Richard Lugar.

Initiative for Future Agriculture and Food Systems

This initiative creates a new mandatory spending account that provides $780 million over five years for research funding with competitive awards made on the basis of scientific peer review or merit review. In Fiscal Year 1998, the amount is $100 million and in Fiscal Years 1999 to 2002, the amount is $170 million each year. This competitively awarded research funding must address critical emerging agricultural issues of primary importance related to future food production, environmental protection and farm income or be for activities carried out under the Alternative Agricultural Research and Commercialization Act of 1990.

Priority mission areas to be addressed with funding in the first year are food genome; food safety, food technology and human nutrition; new and alternative uses and production of agricultural commodities and products; agricultural biotechnology; and natural resource management including precision agriculture. The Secretary of Agriculture, after consultation with the Advisory Board, may change or add to the list of priority mission areas in subsequent years under the legislation ordered reported by the Senate Agriculture Committee on July 30.

Agricultural biotechnology, particularly plant biotechnology, offers new, effective approaches to reaching necessary gains in crop productivity. The mission of the Department of Agriculture in meeting the food and fiber needs of the nation and our world trading partners, is directly served by support of basic research using plant biotechnology. The tremendous advances made possible through the genetic engineering of plants are key to achieving crop production gains needed to meet increased world food demands. A stable world food supply preserved through increased crop production is vital to U.S. national interests.

In addition to the advantages offered in food production, plant biotechnology will contribute to development of life-saving new medicines; more efficient production and use of biofuels (addressing the growing U.S. dependence on imported oil); and improved production of fiber for use in clothing and building materials. Plant biotechnology is being used to produce plants capable of hyperaccumulating toxic metals from soil and water. This research will help make more range lands safe for grazing and help protect water supplies from toxic metals.

The American Society of Plant Physiologists supports the Initiative for Future Agriculture and Food Systems and encourages increased emphasis in support of basic plant research including basic plant research using biotechnology.

Support of plant genome research in the food genome initiative will give plant scientists further needed tools in developing higher yielding crops and value added crops. Interaction with researchers at university and government labs, and with foreign nations and industry could lead to more rapid gains in genomic research. Research on smaller and simpler plant genomes that are closely related to major crops with much larger and more complex genomes could help plant scientists learn far more about major crop genomes decades sooner. We encourage use of a working group of plant scientists to advise USDA on the most efficient approaches to plant genome research. We commend the Department, including National Research Initiative Competitive Grants Program Chief Scientist Ron Phillips, for their outreach to the plant science community in developing the genome initiative.

Areas of human nutrition research that plant scientists are studying now will lead to the development of more nutritious and better tasting foods. Plants are the primary source of nutrition for all animal and human life. Advances in plant science will enable plant scientists to develop plants with, for example, higher protein and mineral content. Support for research in this area by the Initiative for Future Agriculture and Food Systems will help bring these stunning advances to the diets of Americans and our world neighbors. Advances in basic plant research in this area could help in combating malnutrition worldwide.

We recognize the need for a rigorous scientific peer review system to select the best research proposals submitted to the program. Use of peer review panels consisting of scientists familiar with the area of research reviewed will optimize effectiveness of this competitive grants program.

National Research Initiative Competitive Grants Program

The American Society of Plant Physiologists strongly supports the reauthorization of the National Research Initiative Competitive Grants Program (NRICGP). Despite its few years in existence, the NRI has supported leading research which has already been recognized in the research community for its major contributions.

NRICGP-supported fundamental research in plant genetics and plant growth and development have helped give U.S. industry the capability to regenerate genetically transformed plant tissues. This aids in producing new, enhanced crops. The plant science industry in the U.S. has gained a world-leading position with the help of basic research supported by the NRICGP. Continued NRICGP support of basic research is essential to keeping American farmers competitive in the future. American farmers rely upon the cost-saving efficiencies plant research brings to overcome higher labor and land costs here.

Fund for Rural America

We support the reauthorization of the Fund for Rural America. Although there has been an apparent interpretation within the Department that the Fund for Rural America statute excludes basic research, we believe it is clearly stated in the authorizing statute that basic research is to be supported by the Fund for Rural America. As the statute Congress passed last year states, "A grant made under this paragraph may be used by a grantee for one or more of the following uses: (I) Outcome-oriented research at the discovery end of the spectrum to provide breakthrough results...." Clearly, Congress stated that basic research (research at the discovery end of the spectrum) should be supported by the Fund for Rural America. We encourage you to reassert this provision calling for basic research in the reauthorization. We urge you to increase the percentage of the Fund for Rural America dedicated to research, education and extension. Increased support of research would offer more direct benefits to the agricultural producers who are intended to benefit from this program.

Accountability

The American Society of Plant Physiologists supports maintaining the highest standards of accountability in Department of Agriculture sponsored research programs. The level of accountability of the research programs to Congress should relate to the manner in which the research programs are meeting the goals of the legislation enacted by Congress. Specific review by Congress of individual merit reviews of research conducted by the Agricultural Research Service (ARS) is provided in Section 103 of the reauthorization ordered reported by the Senate Committee on Agriculture. The level of expertise in a particular area of science to make a determination based on these reviews is one which has traditionally and appropriately rested in the Department.

General Administrative Costs

We support a revision upwards in the indirect cost cap to 25 percent for the NRICGP and for the Initiative for Future Agriculture and Food Systems. This cap would also be uniformly applied to the Fund for Rural America under the legislation ordered reported by the Senate Committee on Agriculture. The revised cost cap, which is still significantly lower than the indirect costs allowed in some other federally supported research programs outside of USDA, will come closer to meeting the indirect costs of research institutions than the current cap. This revision should help in attracting more, high-quality research proposals. At the same time, a higher cap may mean fewer grants overall if the level of funds available is the same. We urge you to seek increased support for the NRICGP so that the number of grants issued is not reduced with implementation of the more accurate 25 percent indirect cost cap.

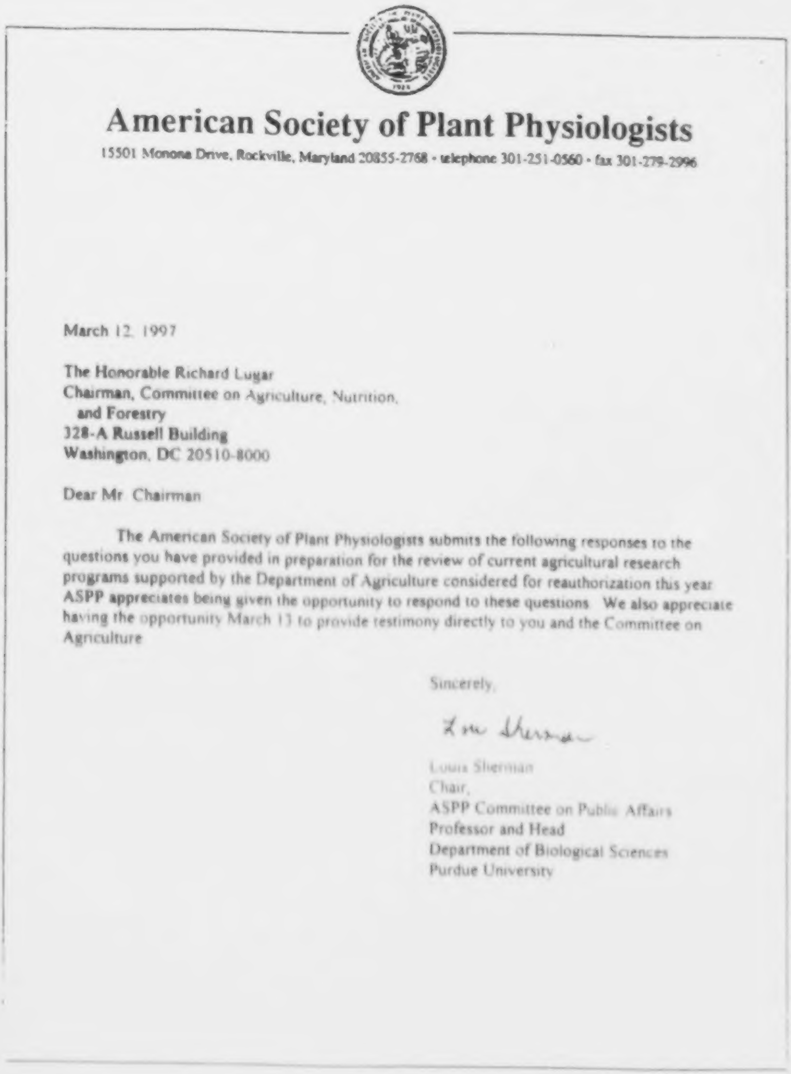
Conclusion

We commend you for your comprehensive review of research, education and extension programs and appreciate the invitation to submit comments on behalf of the 5,000 plant scientists of our Society. The world-leading record of success of American agriculture is closely related to the success of the research programs the Committee has authorized. The plant research community appreciates the leadership of the Committee in supporting research programs which are needed to meet the enormous food and fiber demands of the nation and the world.

Sincerely,

Lou Sherman

Louis Sherman
Chair, ASPP Committee on Public Affairs
Professor and Head
Department of Biological Sciences
Purdue University



American Society of Plant Physiologists
15501 Monona Drive, Rockville, Maryland 20855-2768 • telephone 301-251-0560 • fax 301-279-2996

March 12, 1997

The Honorable Richard Lugar
Chairman, Committee on Agriculture, Nutrition,
and Forestry
328-A Russell Building
Washington, DC 20510-8000

Dear Mr. Chairman

The American Society of Plant Physiologists submits the following responses to the questions you have provided in preparation for the review of current agricultural research programs supported by the Department of Agriculture considered for reauthorization this year. ASPP appreciates being given the opportunity to respond to these questions. We also appreciate having the opportunity March 13 to provide testimony directly to you and the Committee on Agriculture.

Sincerely,

Lou Sherman

Louis Sherman
Chair,
ASPP Committee on Public Affairs
Professor and Head
Department of Biological Sciences
Purdue University

Agricultural Research, Extension and Education Questions for Consideration for 1997 Reauthorization

Funding Mechanisms and Issues

The American Society of Plant Physiologists believes that the most effective methods for allocating funds are through competitive grants administered by the National Research Initiative Competitive Grants Program; and through research conducted by the Agricultural Research Service. We believe that the current system should not undergo dramatic revision, but that future investment by the federal government in agricultural research, extension and education should be based on the following four principles:

1. The research should be of value to more than one state.
2. The research portfolio should include an increase in research based on competitive grants--i.e., invest money on the best science.
3. The research should be in the public domain--As one example, it could be published in refereed scientific journals.
4. Recognition that a reversal of the reduction in number of ARS scientists is needed to adequately meet substantial demands of Americans and much of the world for high quality, safe and affordable food.

   The number of scientists in the Agricultural Research Service has dropped from approximately 2,500 more than ten years ago to about 1,800 at present. This is a precariously low number and a very careful analysis of manpower needs should be made.

With these principles in mind, we offer the following recommendations for consideration:

The National Research Initiative (NRI) should be funded at the $500 million per year level. Use of a portion of commodity price supports to fund this research, particularly when market prices are high, would provide farmers with the safety net of research-generated production increases they will need to compete as transition payments are completed. The model developed by Chairman Lugar in proposing the Agricultural Competitiveness Initiative should be used to provide this support.

Increased funding should be provided to support ARS research.

A training grant program should be established to encourage young people to consider agricultural research for their careers. The lack of such training grants has been a severe deterrent to developing appropriate manpower in the agricultural research system.

A program should be established permanently to fund programs that integrate teaching, research and extension. Once again, such programs should be made competitive and national in scope, and none should be specifically earmarked for individual state agricultural units. In general, these funds should allow for development of regional centers or consortia that integrate schools across states and regions.

Competitive challenge grants to create teachers and teaching teams should be established to enable those interested in agricultural research, education and extension to develop innovative teaching materials and to work with teachers at the K-12 and university levels.

A competitive equipment program should be established to insure that agricultural research and education scientists have access to state-of-the-art equipment.

The US federal government has already developed an extraordinary mission-oriented competitive grant system through the NIH. It is the NIH mission to improve the health of US citizens by preventing and curing disease. It is unfortunate that less attention has been spent to keeping the citizens of the world healthy by providing them with sufficient and nutritious food to eat. The word "stakeholder" is used often in the agricultural system to indicate that many different types of individuals are dependent upon agricultural research and its consequences. However, it should be noted that all citizens of our nation and of nations of our trading partners are ultimately the true stakeholders involved and it is time to provide a more global view of agricultural research, extension and education. This broader approach would be assisted by fully funding the National Research Initiative.

We strongly recommend that these enhanced competitive grant programs be funded by using the savings that stem from changes in mandatory spending programs. In the past, any attempt to redirect formula funds toward competitive grants have led to unnecessary divisiveness in the agricultural research and education community. It is critical to keep in mind that agricultural research has been, and remains, substantially underfunded in relation to its contribution to the national economy and security. An increase in overall funding is needed.

Increased support for the NRI will provide the knowledge necessary to assure the evolution of farming towards systems that enhance the environment and natural resource base upon which agriculture depends while also assuring safe, high quality products from plants and animals. At the current funding level of less than $100 million, the NRI is only able to fund about 20% of all proposals, when more than 50% are worthy of funding. Moreover, proposals are funded for an average of two-and-one-half years, when three to four years is more optimal, and the average funding per year is only about $50,000, when $75-80,000 per year can be justified. Equally important, the total program has been limited to only certain areas with no programs in place for many deserving areas of agricultural science and engineering.

Research funded by special grants fits more closely with research to be funded by the Fund for Rural America, being more applied, targeted, and often commodity or site specific. One major difference between special grants and grants to be awarded through the Fund for Rural America is the competitive merit review at the national level for grants awarded by the FRA but not with special grants. Consideration should be given to extending the FRA so as to fund projects currently funded by special grants, but funding them competitively rather than as earmarks, thereby potentially freeing up some $40-50 million for the NRI that currently is used for special grants.

Basic research can be done purely for the sake of providing a greater fundamental understanding of natural phenomena, or it can be done with a particular problem, need, opportunity, or benefit in mind. Either way, applications are forthcoming. For example, the discovery of how the crown-gall pathogen produces disease on susceptible plants was done for the sake of understanding a natural phenomenon, possibly with clues to human tumors and cancers. However, once it was revealed that the pathogen produces galls by inserting its own genes into the plant genome, the applications in agriculture were obvious; this basic discovery opened the field of genetic engineering for plants. At the same time, one of the most basic contributions to genetics this century, the discovery of the gene-for-gene relationship to explain the genetics of plant-pathogen interactions, was made by ARS scientist H. H. Flor while conducting research aimed at a practical solution to the problem of rust on flax in the North Central states. Both approaches to basic research are important as part of the total mix of research programs supported by the federal government.

Virtually 100% of ARS research is done with a particular problem, need, opportunity, or benefit in mind, that is, the research is mission-oriented. The ARS mission-oriented research, in turn, represents a mix of 90% basic and 10% applied based on a liberal definition of these terms, or at least 50% basic and 50% applied based on a more conservative definition of these terms. Some of the most basic of basic research done by ARS scientists is supported by the NRI in competition with proposals submitted by the scientists from other federal agencies, land grant universities, public non-land grant universities, and private universities and organizations.

ARS programs should remain mission-oriented but move more upstream in the discovery to application continuum, leaving the applied research to private industry. It must be recognized, however, that much of public-good research, such as the development of a new biological control or cropping system, represents little or no profit potential for the private sector. In many of these cases, the agricultural experiment stations are better positioned to carry out the applied public good research either alone or in cooperation with ARS scientists.

Publicly funded research, particularly ARS research, is focused almost entirely on research for the public good, including research on better management practices for conservation of soil and water, prevention of soil erosion, development of biological control systems, and human nutrition and food safety. However, some duplication is necessary, and the public sector must be prepared to fill voids left when the private sector closes programs because of low profits. Biological control of pests and diseases is a good example. Just as a different vaccine is needed to control each disease of animals and humans, or possibly each strain of each disease causing organism, as in the case of the flu virus, so a different biological control agent typically is needed for each pest and plant disease. Private investments are attracted to products that control many pests and therefore can justify the high costs of development, safety testing, and registration.

Private investments are not attracted to products that control only one disease or pest on one crop. For this reason, it has been necessary for the public sector and especially ARS to develop biological control agents. As the Research and Development process moves downstream towards application, the private sector can be expected to take on the product but only when shown by the public sector results that the product works and will generate a profit.

The majority of public research funds should be dedicated to public goods of this type, in which the private sector is unlikely to invest but which is of obvious benefit to society.

The long-term solution to the funding problem for agricultural research can only be reached by use of savings stemming from changes in mandatory spending programs. Providing producers and processors with the technology and knowledge by with to make them more efficient and competitive and that facilitate the evolution of farming, ranching, and forestry systems that conserves resources and enhances the environment is a viable alternative to direct payments to keep farmers competitive and or entice them to conserve resources.

Special grants but not formula funds should be considered for redirection to competitive grants. Some special grants are essential, because they allow the USDA to target a specific problem area, but most funds currently earmarked as special grants would be better spent by awarding funds competitively to the best science. On the other hand, formula funds are the federal government's mechanism to support the U.S. food and agricultural research infrastructure represented as the network of state agricultural experiment stations, colleges of veterinary medicine, and colleges of forestry. Formula funds are used by the states for salaries of scientific and support staff, equipment, base funds, and other elements of infrastructure. Thus, a reduction in formula funds would also result in a reduction of infrastructure that competitive grants usually do not fund.

Just as a redirection of formula funds would cut into the state component of the U.S. food and agriculture research infrastructure, so a redirection of ARS funds would cut into the federal intramural component of the U.S. food and agriculture research infrastructure. Again, laboratories and entire programs would be closed and scientists eliminated, leaving fewer scientists with support staff to do the research. ARS has already been reduced from about 2,500 scientists more than 10 years ago to about 1,800 scientists today. ARS and the State Agricultural Experiment Stations, Colleges of Veterinary Medicine, and Forestry Schools supported by formula funds provide a great deal of public good research that does not lend itself to competitive grants. This includes long-term efforts such as the development of new varieties of minor crops unlikely to be developed by the private sector but which likewise does not lend readily or logically to funding as competitive grants.

Coordination and Priority Setting Process

The approach of funding projects on a state-by-state basis should be modified. We now live in a global economy and the nutritional needs of much of the world ultimately depend upon actions in the US. We must resort to more regional, national and international criteria to help develop the setting of priorities. The NRI has accomplished such matters quite successfully and the direct nature of coordination and priority setting can be left to committees established through NRI

Accountability

The same process that is used for establishing priorities can also be used to determine accountability. Science that is funded by a flexible and competitive program will take some years to analyze and changes cannot be made suddenly. For example, the large investment in cancer research is only now being realized, as are the spectacular advances in the treatment of AIDS. Thus, review committees should be established through USDA and charged to evaluate various areas at five-year intervals. This will establish a baseline for long-term analysis so that a more thorough review can be implemented every ten years.

Research System Structure

The research conducted by ARS should address national and regional rather than just local needs, and should be of the type that is long-term and high-risk and therefore not likely to be done by the states or private sector. This can include research on biological control, photosynthesis, soil and water management and conservation systems, and human dietary needs for optimal health, as just a partial listing of examples. ARS research should also attend to national needs that can be addressed by a single national effort, such as germplasm conservation. It should also address the needs of the Department's action agencies, such as the National Resources Conservation Service, the Animal and Plant Health Inspection Service, the Federal Grain Inspection Service, and the Meat Inspection Service. ARS must also maintain the research capability needed to respond quickly and nationally to the emergence of a new animal or plant disease within the borders of the United States.

The current U.S. system of a land grant university and agricultural experiment stations in each state and the USDA-ARS program with a large percentage of the federal scientists located and working cooperatively with researchers at these land grant universities may well be the premier public-supported research and development system ever developed by the United States or any other country. Any step towards dismantling this system must be done with great caution. The ability of states to address state and multistate needs is directly dependent on the leadership and adaptive research and extension programs carried out by that state's agricultural experiment station. Each state must also have the means to provide cultivars of minor crops grown in that state and unlikely to be provided by the private sector. Because of the regional nature of most problems, states already work together though regional programs and projects. Moreover, just as public-supported institutions have found it necessary to step in with public-supported research to fill voids left by private-supported organizations, so states will find it necessary to maintain some minimal infrastructure of faculty, facilities, and equipment to fill voids left by regional and national programs. Some duplication is necessary.

In general, the states with agricultural colleges least likely to survive downsizing and regionalization are also states with least resources available to maintain their own independent agricultural college. Withdrawal of support at the federal level will automatically drive the land grant system towards fewer universities and regionalization. Thus, the major impact of regionalization of agricultural research carried out by the states will be on states with smaller colleges, which will become virtual outposts to the larger currently best supported colleges of agriculture. Any consideration for consolidation and closure of ARS laboratories should be based primarily on the quality of science produced by that laboratory, that is the track record of the laboratory. It makes no sense to close out an ARS laboratory that is scientifically very productive, while maintaining or increasing support to an ARS laboratory that is scientifically unproductive.

It should also be kept in mind that many and possibly the majority of the more than 100 ARS laboratories are, and have been since the beginning of ARS, on campuses of land grant universities. Literallv, these ARS scientists have their offices and laboratories in space at land grant universities within the academic department of his or her discipline. This is like mixing the FBI with the State Patrol. No other nation and no other branch of the U.S. government has achieved this kind of state-federal mix and cooperation. A federal laboratory of three of four scientists by itself may not be a critical mass, but locate a small group of federal scientists within a department of their state peers with a mandate to serve national needs consistent with the ARS goals and mission and they become a highly productive unit. The scientists themselves by nature of the scientific process will avoid duplication and strive for cooperation--a win situation. This is because no scientist worth his or her salt will work on a project already done or being done by another scientist.

Private Sector Issues

The ARS process for development of CRADAs is a model for the federal government and land grant universities. ARS CRADAs provide a mechanism for the private sector to support ARS work, but also protect the public investment and intellectual property while facilitating technology transfer. For example, ARS CRADAs state that any inventions made jointly by ARS and the Cooperator will be the property of the federal government but will give the Cooperator first right of refusal with any licensing that might be possible or necessary to bring the product to market. CRADAs also provide a formal mechanism by which the private sector can work with ARS scientists and test ARS inventions before committing funds for full-scale testing and licensing. ARS, in turn, has the option to terminate agreements within specified time frames and a staff dedicated to the development of high quality CRADAs.

Other Issues

The U.S. currently is a world leader in the agricultural sciences with strong linkages throughout the international agricultural research network. Of major concern, however, is whether this leadership can be maintained in the face of any major downsizing or reduction in research funds. European and Asian countries both are making substantial investments in basic research, especially in biotechnology research where ownership of intellectual property pertaining to genes and genomes could decide the ability of nations to remain competitive in agricultural markets in the future. Meanwhile, the U.S. agricultural biotechnology industry is becoming increasingly more vertically integrated, driven largely by multinational corporations buying up smaller seed companies. Major attention should be given to public policy issues affecting access to intellectual property by public-sector research programs to both assure continued U.S. strength in international agriculture and to assure a sustainable supply of food and other products as well as services from agriculture for the American people.

CARET

Council for Agricultural Research,
Extension, and Teaching
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Washington, DC 20036-1191
Tel: 202-778-0824
Fax: 202-296-6456

July 15, 1997

The Honorable Larry Combest
Chairman
Subcommittee on Forestry, Resource Conservation, and Research
Committee on Agriculture
Washington, DC 20515

The Honorable Calvin M. Dooley
Ranking Minority Member
Subcommittee on Forestry, Resource Conservation, and Research
Committee on Agriculture
Washington, DC 20515

Attention: Russell Laird, Subcommittee Staff Director, 1336 Longworth Building

Dear Representatives Combest and Dooley:

Thank you for your joint letter of July 8, soliciting the Council of Agricultural Research, Extension, and Teaching (CARET) input into the hearings reviewing the agricultural research, education, and extension programs. CARET shares your concern about the critical need for strong support of agricultural research and education programs. I am pleased that you two are giving energetic leadership to making the best agricultural research and education system on the planet even better.

At this time, I do not have specific legislative proposals or language to offer. Frankly, I am concerned that many of the proposals I have seen which would earmark monies, set up additional national committees, and revamp the formulas will not achieve the objectives being sought. This is not to say the system is perfect, but it is not complacent nor inflexible. Indeed, major efforts are underway within most states to implement the recommendations of *From Issues to Action*, a major national study, funded in part by the W.K. Kellogg Foundation. In addition, in his testimony to the committee, Dr. Thayne Dutson of Oregon State University offered several insights.

A couple weeks ago in a speech at Texas A&M University, Congressman Stenholm indicated that time may not permit completion of Title VIII and that the legislation may simply have to be extended for a year and revisited next year. I certainly hope that this does not happen. I urge both of you to keep up your hard work and bring Title VIII to completion this year. Over the

A voluntary citizens organization cooperating with the
National Association of State Universities and Land-Grant Colleges • Board on Agriculture

past five or so years there have literally been dozens of studies, reports, and hearings. It is time to bring, what I believe to be the most important plank in national agricultural policy, to a resolution so that the leadership of agricultural research and education can get on with their mandate.

If you would desire our comments on the final USDA testimony and/or any legislative proposals, CARET would be pleased to respond.

Sincerely,

Joe

Joseph D. Coffey
Chairman
Council for Agricultural Research,
Extension, and Teaching

COUNCIL OF SCIENTIFIC SOCIETY PRESIDENTS
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21 JULY, 1997
RESPONSE BY MARTIN APPLE, PhD, EXECUTIVE DIRECTOR
OF THE **COUNCIL OF SCIENTIFIC SOCIETY PRESIDENTS**

"...it is even more critical that strong support for research programs is maintained..."
[L.Combest(R-TX) & C.Dooley(D-CA) in letter of 8 July 1997]

To: House Committee on Agriculture, SubComte on Forestry, Resource Conservation and Research
Chairman Combest , Ranking Member Dooley, Members of the Committee

We appreciate your consultation with the key stakeholders of the science research community in your quest to assure that America's world class science research community exercises its unique talents most wisely and effectively.

The Council of Scientific Society Presidents (CSSP), our national science policy and leadership development center, is an organization of the top elected leadership of scientific professional societies; we cover over 100 science disciplines and our member societies have a combined membership of over 1.4 million scientists and science educators.

In your letter of July 8, 1997 to the CSSP, Chairman Combest and Ranking Member Dooley state that in light of fundamental changes to federal farm policy which came with the passage of the Farm Bill, it is even more critical that strong support for research programs is maintained. We are very appreciative of that wisdom.

We will here address the importance of agricultural research to the American future and how it could be improved in order to meet the challenges placed upon it by growing worldwide demands.

Agricultural research pursuant to the Farm Bill should encompass all of the research that is relevant for the overall agriculture and food sector. This means it should include all the research relevant to the production and management systems for agriculture, the food production system including nutrition, and the environmental, economic, and rural factors that directly relate to the agriculture and food system. For simplicity, we term this agricultural research.

Our focus is on foundational research for this broad agriculture, food, and environment sector. Foundational research is fundamental research that serves as the basis for either additional fundamental research or future applications.

Agricultural research is funded and conducted by three main entities: federal agencies including extramurally-funded research, state agencies (mainly universities), and the private sector. Our primary interest is the federal responsibility in relation to the Farm Bill. We believe the focus for federally-supported agricultural research should be foundational research; research of national scope and impact; research needed by other federal agencies for their missions; research of a scale and magnitude beyond the usual capacity of other research entities; and federal extramural funding.

FEDERAL ROLES IN RESEARCH

Dozens of studies have concluded that the economic payoff of federal investment in agricultural research has been immense when assessed over multi-decade periods of time. The internal rate of return on each dollar originally invested is 15-50 cents per year, with an added secondary rate of return nearly the same size. Rates of return so high indicate an economic inefficiency, that is, an historic *underinvestment* by the federal government in foundational agricultural research. Thanks to research and development, and vigorously supported trade programs, the USA in 1996 exported over $60 billion of its agricultural output, up from $40 billion in 1993.

The purposes of agricultural research for the 21st century must embrace the entirety of the agricultural, food, and environmental sectors. In addressing these purposes, the federal government should have six inextricably linked major roles:

- First, to champion the sources and systems of discovery and innovation in all science domains related to agriculture to ensure the US continues world leadership.
- Second, to strengthen and build the capacity of US agricultural innovation sources, systems and processes as the critical key to sustained national strength and economic growth in a rapidly shifting worldwide economy.
- Third, to assure adequate growth and consistent development of support for US long-range foundational agricultural research.
- Fourth, to lay the foundations for a defined, vigorous, dynamic, better US future in all outcomes related to agriculture.
- Fifth, to assure the Nation has evolving, comprehensive, strategic agricultural research plans that address the most important issues of the national future.
- Sixth, and very importantly, to fund and conduct research for agriculture that is nationally relevant, addresses major national needs, contributes to a sustainable agricultural economy, and is both generic and foundational for furthering innovation and national goals.

ESTABLISHING NATIONAL GOALS

The federal government must address and ensure for the Nation a robust long range foundational agricultural research enterprise and its supporting systems: a superb research university system, effective technology/knowledge transfer systems, and an unrivaled scientific workforce.

To fulfill these roles, we believe certain ***fundamental principles*** must apply to all aspects of foundational agricultural research, from setting priorities through delivering results. These principles include:

- Use overall sustainable agriculture as the basis for considering all research for agriculture.
- **Fund research through competitive awards based on merit reviews by qualified experts, where the criteria for evaluation are the quality and prospect of the ideas and their relevance to agricultural missions.**
- Use funding systems that are maximally open to all qualified scientists who wish to participate in research for agriculture.

- Set priorities for federally-funded research consistent with the research having a major probability of conferring significant, long-run national value.

- Emphasize foundational research: Research that serves to lay foundations for either further fundamental discovery or future application.

- Use a "bottom up" strategy, providing accomplished scientists the lead role, in identifying and setting research priorities.

- Ensure focus on critically important issues through national, unified, strategic research and application plans.

- Reestablish by word and deed the "culture of connection" between the doing of research and the extending of research into systematic application.

- Recognize that US research relevant to its agricultural sector is often also closely relevant to international food security and nutrition.

- Get Congress out of micro-managing research through earmarks and out of funding special grants and other projects initiated through the appropriations process.

To elaborate: **SETTING RESEARCH PRIORITIES**

"Basic" and "applied" research are distinctions without a difference: the research itself may be indistinguishable except for the motivations of the researchers. We will here use the term "foundational research" throughout to convey that the scientific discoveries made serve to lay foundations for either further fundamental discovery, or application to practical ends, or both.

Specific research goal setting and research agendas are not best set by the federal government. The role of the federal government is to facilitate these processes. The expertise and insights of the science community and other key stakeholder communities are the best resources for setting research agendas. It is the role of the federal government to recognize and effectively utilize these external resources.

In addition to the fundamental principles, additional emphases should apply to setting research priorities. These include:

- Set priorities for federally-funded research consistent with conferring significant, long-run national value, e.g., value conferred by confidence in the quality of the research because it has survived rigorous merit review by qualified scientists; value conferred by representing federal responsibilities, or value conferred by focus on critically important national issues.

- Emphasize research that extends outward from current limits of knowledge into the next frontiers, unknown territories, and uncharted paths.

- Use a "bottom up" strategy in identifying needs and setting priorities; utilize stakeholders and research users in proposing research priorities, and support agricultural science researchers in identifying and pursuing the highest priority research questions.

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All agricultural research involves discovery of building of and connecting ideas that lead to more discoveries We need to benefit from this lesson of our history our best results will continue to come out of a very long- term perspective, thus **the federal role in research should be to provide "patient capital."**

After establishing these frameworks and broad national agricultural priorities, we believe that the most effective strategy is a bottom-up decision-strategy involving scientists for defining specific research priorities, it will ultimately be more successful, and the USDA and the Congress should continue to be committed to utilizing the vast and deep expertise of the Nation's science research community certainly as the dominant priority setters for scientific research Priority setting systems need to recognize and capture new opportunities on a continuing basis The CSSP would be pleased to assist the Congress and the USDA by developing a list of 100 important unanswered research questions as part of informing the 5 year planning process of developing each new 5 year Farm Bill

We also need to ensure against tedious or over-prescribed processes that result in excessive delay of progress or even compound the already unmet need for more agility The primary impediment to research agility in the USDA is the history of excessive micro-management of the USDA by Congress which slows down all USDA research decision-making and undermines any willingness of senior research directors to take the kinds of prudent risks some of which will fail, that university-based research directors take all the time The key unmet need in the USDA research enterprise is the opening, even redesigning, of its research-systems to foster maximum creativity Creativity is not an incidental attribute of research, but the fundamental dynamic needed to ensure the national future

All research has a common purpose to find out what we do not yet know, but want to know Well designed research programs of national scope should connect to the overarching national goals

Setting research priorities can be done very effectively by the science community as in the USDA's National Research Initiative (NRI) and also in the Sustainable Agriculture Research and Education (SARE) program In these two programs **leading researchers of the scientific community, with input from stakeholders, determine what is possible, the most likely to succeed, and the highest priority**.

The NIH model sets clear priorities by using diversified groups of frontier, leading experts that conduct peer-reviews of competing ideas from across the science community The NSF model uses the scientific community as the primary priority-setter and these priorities evolve as rapidly as the new knowledge requires it to Scientist-based prioritization models, which can include stakeholders groups, win Nobel Prizes and lead to dramatic progress Persistent success depends on the agility and flexibility in the priority setting process Both of these models are positively relevant to the agricultural research sector

Business R & D models tend to define priorities as (i) the most pressing problem this/next year and/or (ii) the most lucrative growth markets and (iii) the most rapidly attained products or improvements on products that provide a competitive edge in those markets in the next year or two The world demand for food will rise rapidly over the next generation However, so will the competitiveness of world market, for example the USA is experiencing this year a possible drop in farm exports This speaks to a need for developing new value-added agricultural products The success of the short-term business priority model depends on the depth and breadth of pre-product foundational research available from which to draw solutions it cannot succeed by itself on a sustained basis unless that research is available Thus it is clearly unwise policy to make short- term business demands the primary driver of priorities It is also wise to ensure that U S business interests have ready access to new knowledge and the implications of new discoveries It is also wise to ensure a continuing, iterative long- term dialog between business and the research community to increase the probability of an effective connection between research and the application of research

The Nation has an excellent, world- leading fundamental research capacity in its top doctorate-granting universities and a world-class technology application capacity in its businesses. Our understanding of the middle domains of research entities, innovation and connection systems, are not as well developed. An unmet national priority is to study these connection systems, develop and test many alternative models to improve them, and support the models that work best over the long term.

Shifting all future USDA research funding growth into university-based research and merit-reviewed internal research will provide the highest payoff to the nation for the resources invested:

FUNDING RESEARCH

In addition to the fundamental principles, additional emphases should apply to effectively ensure funding research. These include:

- Emphasize foundational research to the fullest extent practicable.
- Apply enough funding to program areas and specific projects--and for sufficient duration-- to make a real difference.
- Fund the best ideas and best people as a higher priority than funding institutions.
- Develop and sustain the creative scientific culture that increases the probability of "breakthrough" research.
- Encourage leveraging of research resources, but recognize the key role of federal leadership in funding nationally-relevant fundamental research.
- Apply federal funds to national issues, but get Congress out of micro-managing research through earmarks and out of funding special grants and other initiatives inserted into the appropriations process and related venues.

The relative roles of industrial and federal funding for this approach should be seen as a spectrum of attributes that indicate primary sponsorship, not an absolute black-or-white issue. When the research addresses a national problem, has a long-term, too-high-a-risk factor, or requires too large a size of investment to be likely to find a single-business sponsor, it is the federal role to to participate to help the Nation. But if the research has a short-term focus, addresses a local or regional problem, is a reasonable business risk, or is of a size likely to achieve a single-business sponsor, it should not be the federal role to support it. Thus, it is not an issue of the government picking winners nor providing corporate subsidy, but of how best to support the national interest across this spectrum.

To achieve the desired objectives for focusing agricultural research on national goals and on foundational research a number of steps should be undertaken during the next 5-10 years, including:

- The fraction of the USDA budget devoted to foundational research should increase steadily in order to achieve the new knowledge needed to ensure world leadership for the Nation and provide the Nation its high rate of return into the growth of U.S. Gross Domestic Product.

- Increases in research funding from FY 1997 forward should be directed to university-based, peer-reviewed, investigator-initiated, extramural competitive grants of 3-5 year duration
- All internal USDA researchers should be shifted during the next 5 years into extramurally peer-reviewed competitive grants, with 5 year maximum renewals. All active USDA researchers should be encouraged to take brief sabbatic leaves periodically to conduct foundational research in top university laboratories, and vice-versa. Minimum standards for retention and promotion of USDA research staff should match those for retention and promotion at the top US research universities
- Robust knowledge and technology transfer systems for capture of foundational research into commercial value should be established as standard operating policy
- Multidisciplinary research programs and projects should receive appropriate emphasis for the complexity of the priority research questions
- All Congressional earmarks should be eliminated, and special grants shifted into competitive merit review

Too much of the federal agricultural research is not subject to the processes that serve as fertile ground for breakthroughs: research ideas initiated by frontier research leaders, regular and rigorous peer review, multiple working hypotheses, a national culture that strongly encourages unique and unusual agricultural research ideas, and accountability for resource use in medium term increments.

Among the most important breakthroughs in agriculture in the last quarter century were the first genetic engineering processes, all of which grew out of federal funding at Land-Grant universities that met the above criteria, but which, ironically, were not funded by federal agricultural research appropriations (to the Department of Agriculture) until the breakthrough had already been achieved.

One of the largest disincentives to breakthroughs is Congressional affection for earmarks: scientists whose lack of boldness, poor track record of new ideas, and lack of imagination and originality have failed merit review nevertheless find sources of research funds through direct Congressional intervention that not only circumvent rigorous merit review but also take money out of the hands of those successful in the peer-review process. These earmarks send the message to new scientists year after year that it is not the merit of ideas or accountability for results that makes one successful, but whom you know. The idea of taking risks on new ideas is being replaced by too much caution. Repair of the last decade of Congressionally-arranged damage might take years to recover if we start now; if we do not stop this counter-productive practice, we will lose even more.

The most important role for Congress and the USDA in ensuring competitiveness as price supports decline may be to stop looking for quick fixes and focus on increased support of imaginative merit-reviewed foundational research. The private sector will need a wide variety of discoveries and improved innovation systems to create higher value. If the past is any guide, many of these discoveries and innovations are the kinds which we might not even be able to imagine for several years.

Setting rigid directions, or pushing private sector short term demands too soon may limit the direction of research imagination and decrease the chances of ultimate success. Congress once had the sure answer to polio--build the best iron lung and mass produce it; the "patient capital" of federal investment led to a vaccine. The iron lung was one answer, the vaccine was the solution. If all our resources had been channeled into the wrong research, we might lead the world in iron lung technology and have yet found no solution to polio.

DOING RESEARCH

In addition to the fundamental principles, additional emphases should apply to doing research. These include:

- Provide the fullest possible access to the agricultural research system by ***all*** qualified investigators, irrespective of the institution. To the fullest extent possible, ensure research is conducted by most qualified investigators with best ideas and best records of and prospects for success. This is most effectively accomplished through rigorous peer-driven merit review for quality and relevance.

- Ensure national capacity and vitality for continuing long-term, fundamental studies, including genetic, physiological, environmental, and ecological studies and analyses. Without such studies it will be virtually impossible, for example, to ensure adequate quality of soil and water resources for sustainable agricultural systems.

- Ensure that multidisciplinary research problems can be in settings that provide for appropriate proportions of multidisciplinary research.

- Do research in symbiotic relationships with potential extenders across the nation. Expedite knowledge and technology transfer—to major national and supra-state needs, focusing on those of highest priority.

- Expand the recognition that US research for its own agricultural sector is often closely relevant to research necessary for international food security and nutrition.

It cannot be emphasized too strongly that research for the agriculture, food, and environmental sectors should be done by those persons with the best ideas, strongest proven records, and most demonstrated promise—irrespective of their universities or research entity affiliations. Federal funding, through the USDA and otherwise, should be available to them and to all qualified scientists on the same merit-based competitive basis. This is the principle of quality and openness which is the guiding characteristic of the NSF and NIH systems, which careful observers believe to be the heart and genius of the best American federally-funded research systems.

Foundational agricultural research is both fundamental and an intimate mixture of both fundamental and mission-oriented/linked research and development. It follows from NRI legislation that this mixture is also appropriate for agricultural research. **Because of the high merit of the NRI program, the Congress should move swiftly to ensure it reaches its first $500 million dollar funding plateau.** The history of the lag time from "patient capital" in fundamental research to big impact may be 10, 15, even 20+ years. We can all see a wide variety of crises developing that far ahead, and the time to begin "research for the vaccine" is now.

We encourage that your policies for the ARS laboratories, because of their high quality research staff, direct the ARS into becoming successfully funded on a competitive basis, deriving future funds from externally peer-driven merit and relevancy-review, with a transition from the existing system phased in over a reasonable period of time (at least five years).

The major role of Land-Grant universities in research, and by extension, in agriculture, should be assured, indeed even increased in various ways such as with further emphasis on federally funded foundational research. But, it also follows that research for the agriculture sector need not be done only at the Land-Grant universities with their time-honored and broadly effective research programs. There should be systems and policies established, including provision for federal funding, for further participation by non-Land-Grant universities in such research.

It follows that extramural funding for the research should, in the main, be allocated through competitive processes using peer-driven merit review processes where the criteria are (i) quality, (ii) prospect for success, innovation, and advancement of knowledge, and (iii) relevance—broadly defined—to the missions of the USDA.

Universities are exceptionally fertile places for conducting research. Indeed, careful observers regularly conclude that the genius of the American research enterprise is the American "research university." Land grant universities are, to a large extent, research universities. Research of highest quality is not limited to them, of course. Exceptional research is also done at private and other public universities, and these should have greater access to federal funding for foundational agricultural research than at present.

Recent studies, tracking hundreds of thousands of US patents to their source, show that most of the commercial patents by which American companies develop their competitive advantage stem from federally funded and university-based research. As we enter the next century of global competition, this important recognition as a basis for federal policy could well determine our nation's economic future.

Land-Grant universities, and their colleges of agriculture and cognate units (schools/colleges of human ecology, forestry and/or natural resources, veterinary medicine and similar units), should be nourished and supported. Their research must also be increasingly subject to the same standards of external peer-driven merit review as characterizes the rest of higher education—and relevancy to the USDA missions, akin to the NIH model of mission relevance.

REDRAWING BOUNDARIES INTO AGROECOLOGICAL REGIONS

A comprehensive system of federal and state laboratories, experiment stations, and field study sites is highly desirable throughout the country given the extraordinary range of physiographic, climatic, and productivity characteristics of the Nation. An intensive effort should be made to identify the optimum set of state and federal facilities which serve supra-state and national needs. **Consideration should be given to creating multi-state, agroecological regional facilities to serve the interests of major agroecological zones of the Nation.** The artificial boundaries of states are no longer appropriate boundaries for determining resource allocations or optimizing agroecological regions.

It is, of course, appropriate to use federal funds to encourage coordination. Carefully constructed cost-effectiveness tests must be applied, including using criteria based on economic effectiveness and scientific quality. Coordination of the federal, state, and private sectors is of value when it serves useful purposes of enhancing resource deployment, quality and the pace of securing research findings. Scientific creativity is our goal to ensure the highest return on our federal investment; it is not the same as standard accounting procedures or their measures of efficiency, and we should not apply criteria to measure progress that stifle creativity.

Since a variety of effective models exist, lessons should be drawn from them to help optimize coordination. A sensible way to increase coordination—and, importantly, to expedite knowledge and technology transfer—would be to define major national and supra-state needs, focus on those of highest priority (using urgency of issues as a major weighting factor), and proceed to ask the science community to develop some form of evolving, unified strategic research and application plans for both major research areas and also for key, urgent contemporary issues.

These key problems include such issues as biological and integrated pest management, ecosystem-based sustainable agriculture production systems, new uses and products, optimizing animal production systems, rural economic vitality and vulnerability, and agroforestry systems.

From these plans, viewed broadly, and in the context of agroecological zones, effective means of coordination can be established.

International agricultural research represents a special opportunity for the US agricultural research system. This is particularly true because increasing indigenous food security throughout the world is a first key to stabilizing both population and democratic political systems and for laying the basis for subsequent economic development for US overseas markets.

Research has provided huge benefits over decades in agriculture. The promise of newer science and technologies is awesome. US farm income from farming in 1996 was about $250 billion and exports $60 billion. This huge role in the US economy and world marketplace places America in a world leadership position. That position is not assured for the future; it will depend on the wisdom and foresight with which we address now, and for the next five years, the research results needed by the Nation over the entire next generation, and evolve our systems of innovation to stay on the leadership frontier.

Martin Apple,PhD

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July 16, 1997

The Honorable Larry Combest
The Honorable Calvin M. Dooley
Subcommittee on Forestry, Resource
Conservation, and Research
Room 1301
Longworth House Office Building
Washington, DC 20515

Dear sirs

Thank you for the opportunity to express my thoughts regarding coordination between the public and private sectors in Extension programs.

Our country can benefit in many ways if Cooperative Extension is strengthened and encouraged to take bold steps to enhance our society. I see Extension as providing the impetus for generating private sector resources to launch and maintain needed community and family building programs throughout America. I am convinced the private sector will respond to focused, efficiently managed, educational endeavors that meet vital national needs!

A perfect model is our Los Angeles 4-H After School Activity Program. I am excited about what has been accomplished, as are many others in the public, academic and private sectors. This was a concept that started in an "inner-city" Los Angeles neighborhood by a 4-H Advisor. We now have 25 4-H After School sites that operate every day, and virtually year around. All are located in "inner-city" public housing developments and/or the adjacent elementary school. The kids who participate are doing better in school, at home and in their community.

Your committee needs to know that the private sector works closely with Extension/4-H to make this program a reality. Last year, the $1.2 million program had 55% private sector funding, and the balance came from various public sources. This model could, and should be, replicated in every county in America. Extension and the private sector teaming together to enhance the social health of our nation. Think of the dynamic impact on youth and families throughout our land!

I see our Extension people with significant expertise in a wide array of academic, communication and teaching skills, while the private partners bring management expertise, financial skills, and results-oriented thinking. It's a classic example of '1 plus 1 equals 3'!! As the Southern California Extension Director says, "we have been able to accomplish far more with this innovative 4-H program with private sector involvement than we could have ever done on our own."

Ron Mertz
President

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The Honorable Larry Combest
The Honorable Calvin M. Dooley
July 16, 1997
Page 2

I have enclosed several copies of the 4-H program brochure and "15 facts" sheet. This will give you additional insights about this award-winning program that is a premier example of true public/private collaboration.

All of us are looking for programs that work. We are convinced the Cooperative Extension's unique position, expertise, and reputation help all of us leverage our tax dollars for the betterment of our communities.

Sincerely,

Ron Mertz

Enclosure

cc: Russell Laird - Subcommittee Staff Director
Roger C. Beach - UNOCAL

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LA 4-H ASAP
15 FACTS THAT SAY YES!

1. Twenty-five (25) inner-city 4-H After School sites operate 2 ½ hours daily all year around.

2. Over 1,500 youth between the ages of 7 and 13 are enrolled.

3. Administrative costs are 8.4% of the total budget. 90.3% of funds are spent on direct site costs and program development.

4. Strategic planning and resource development is done by the 4-H Vision Team, a group of business, education and government executives committed to helping at-risk youth in our County grow into stronger citizens.

5. It's working! Kids, parents, teachers and principals agree that 4-H is benefiting youth.

6. 4-H emphasizes teamwork and cooperation. Racial groups are coming together for improved understanding and tolerance. Parents are involved in shaping new attitudes and new ways of interacting with each other.

7. Our 4-H kids show significant changes in progress for language arts, health, learning skills and social skills.

8. The 4-H sites are located at public housing developments and/or adjacent elementary schools.

9. Site coordinators are from the community, trained for their positions by 4-H staff who work with each site to assure quality.

10. A professional evaluation organization, Southwest Regional Labs (now West Lab) is following up its initial evaluation of the program's progress with a study due for completion in June, 1997. In the first study, parents and teachers reported the following:
    ^ 76% noted improvement in 4-H youth's interest in schoolwork
    ^ 65% saw improvement in homework completion
    ^ 74% reported improved cooperation with peers
    ^ 83% said that 4-H youth solve problems better
    ^ 85% of parents and teachers wanted their children to stay in 4-H

11. Youth who participated in the first study reported the following:
    ^ 86% commented that they got help with their daily homework
    ^ 94% said that 4-H was fun and interesting (and not boring)
    ^ 85% said that 4-H helps them stay out of gangs

^ 41% said they would hang out on the streets if 4-H was not there
^ 95% reported they learned new things in 4-H
^ 97% said they liked the adults in the 4-H program

12. The private sector contributed 55.3% of the funding in 1995, and public (government) provided 44.7%

13. Thirteen (13) colleges and universities are proving mentoring/tutoring

14. 4-H is part of the University of California's Cooperative Extension

15. This unique 4-H program is a premier example of the National 4-H Council's new mission statement: *"Building partnerships for community youth development that value and involve youth in solving issues critical to their lives, their families and society."* 4-H lives up to its motto: "More than you ever imagined."

LA's 4-H After School Program is UNIQUE - Here's why !!!

- Fundamental Goal is Educational Improvement
- Community Based
- Public / Private collaboration
- "Tie" to University of CA system
- Non-formal Education based
  - Experienced based
  - "Hands-on" learning
  - Volunteers active in delivery
  - Real world setting
- Leadership development component
- Citizenship development component
- National linkages to 'sister city' programs
- Focused on children in very high risk environments
- No "bricks & Mortar" to maintain
- Partners exceed 25 in number (Govt., Education, Business)
- Decisions made by powerful Vision Team of empowered people
- Parent involvement & training included in program
- VISTA volunteers work to involve entire community
- Racial understanding and harmony is stressed and taught

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Kevin S. King
Executive Vice President

August 18, 1997

Mr. Larry Combest and Mr. Cal Dooley
Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
US House of Representatives
Longworth Office Building, Room 1301
Washington, DC 20515

RE: USDA Forest Inventory and Analysis

Dear Mr. Combest and Mr. Dooley:

I am writing with the understanding that you will be considering the time frames by which the Forest Inventory and Analysis (FIA) is conducted as part of this year's Farm Bill. The FIA provides crucial data on the health and availability of forest resources on a national, state and to a lesser degree of reliability local (county) level. A more frequent and predictable FIA cycle is important for public decision making and provides important information about the availability of forest resources for forest dependent businesses.

Forest policy issues are often driven by emotion and a lack of available data. A more timely FIA will improve our ability to support public policy discussions with the facts. It will lessen the likelihood of the trees getting in the way of forest in these debates. I would urge you to revise the research title of this year's Farm Bill to shorten the FIA cycle to five years.

Let me give you some idea of the delays that current exist in receiving this important information. New York's most recent FIA was completed in 1993. Some data was available shortly after the survey's completion, however, the complete analysis was not released until August of 1995. The last survey prior to this was completed in 1980. This meant that New York went more than 15 years between the last survey and the most current survey information becoming available. This is simply too long a time period.

There is a further danger that trend analysis and relative comparisons between surveys will become increasingly difficult without regular and predictable surveys. As the debate over the use

COMMITTED TO NEW YORK'S ECONOMIC AND ENVIRONMENTAL GROWTH of natural resources in the Northeast and throughout the country continues to increase, this information becomes more critical. I hope that you will support more frequent FIA cycle in this year's Farm Bill.

Sincerely,

Kevin S. King
Executive Vice President

cc NY House Members

Hillsborough
County

Board of County
Commissioners

JOE CHILLURA, JR.
COUNTYWIDE
COMMISSIONER

Mr. Chairman and Members of the Subcommittee, I welcome this opportunity to bring to your attention a relatively neglected area of research in which a modest amount of funding offers great promise of dividends in terms of business activity and economic development in certain rural areas of this country.

The research involves the production of ornamental tropical fish and aquatic plants, a component of the over-all aquaculture industry which today represents the fastest-growing segment of agriculture world-wide. Undergirded by a timely and targeted research effort, domestic production of ornamental tropical fish would be poised for swift expansion with strong spill-over or multiplier effect in areas where these operations are located.

I speak, of course, from the perspective of a County Commissioner for Hillsborough County, Florida, and my objective is the jobs which would result from expanded economic opportunities for family-size fish farming operations which are located on farms averaging 10 to 15 acres in size, well suited to rural areas just outside of urban areas.

We have some 100 fish farms in the County, which alone accounts for some 75% of U.S. production; nationwide, such production leads to an estimated $70 million per year in sales. However, domestic production accounts for only 30 to 40 percent of North American sales, with the remaining 60 to 70 percent coming from overseas. Approximately 85 percent of imports come from Asia, countries such as Malaysia, Singapore, Thailand, Indonesia, and China which produce many of the same varieties as those produced here.

They enjoy lower production costs, but benefit as well from a high level of support provided by their governments and research institutions which have long recognized such farms as producers of a high-value export crop. They accordingly benefit from strong research and extension education programs, combined with financial incentives for development of new farms. An example of foreign government involvement in, and assistance to, their aquaculture industries can be found in Taiwan's announcement earlier this week on August 11 that they are investing $17 million in raising mouthbreeders in Panama for export to the U.S. market.

The sort of strong research effort for which we seek support, based in the area of principal concentration of producers' operations, would lead to rapid introduction of findings into the production mainstream and equip our farmers to mount a strong challenge to foreign suppliers.

When we discuss research needs of ornamental fish production, what precisely are we talking about? Science-based technologies in nutrition, reproduction, and water quality management will be key to insuring the success of a thriving domestic industry.

Issues involving water alone are forcing farms to find ways to increase production while at the same time reducing their use of resources. Effluent from fish farms have also come under regulatory scrutiny, and development of new filtration and reuse systems are lagging behind demands placed on today's farms. The issue of new drug development for treatment of diseases and other pathologies to which ornamental fish are susceptible in a fish-farm environment is another relatively uncharted area.

To this add modern farming technology, including computer-controlled systems, for adaptation to the needs of smaller producers, requiring research and demonstration projects.

The rewards for a successful research effort in support of this industry will be worth the effort. Ornamental fish farms, relatively clean enterprises, are consistent with the trend in Florida and elsewhere toward small, intensive, high-tech operations, producing a high-value product and paying farm wages well above the minimum wage. A recent study by the Hillsborough County Board of County Commissioners found that tropical fish had the highest economic impact of any agricultural enterprise, an astonishing $11 million per acre over a 50-year period.

Just one example of the multiplier effect at work here: Today, ornamental fish and aquatic plants combined represent the number one air-freight commodity leaving Tampa International Airport.

In recognition of the merits of a research effort dedicated to expanding and upgrading U.S. production in this industry, Hillsborough County and the University of Florida established the Tropical Aquaculture Laboratory in Ruskin. This facility has been able to lay the foundation for future programming. Initial funding has been secured for renovation of a vacated National Weather Service office and for purchase of an adjacent 7.5-acre tropical fish farm. In addition, County, State, and Federal funding has been secured for hiring a core faculty and support staff. (See attached funding sheet.)

Its work to date has produced disease diagnostic services and predator prevention programs which have already resulted in savings in excess of $500,000 for participants. Current research projects in genetics and fish health both have potential to generate millions of dollars annually when results are provided to the industry. Recent approval of a pesticide for tropical fish farmers as a result of existing programs should save over $10 million annually in fish that would otherwise be lost.

However, this facility will not be able to provide state-of-the-art research or training programs without additional funding. Capital improvements are needed to conduct controlled experiments and develop new product lines. The sum of $1.5 million is being requested for construction and equipment for a hatchery, a nutrition laboratory, and a water quality laboratory.

To fund research and education activities at the Ruskin Tropical Aquaculture Laboratory, the sum of $200,000 per year for five years is being requested. This would be used to fund research in nutrition, reproduction, water quality, and fish health.

Given the direct connection between the research currently being conducted by the nucleus of a research facility at Ruskin and its consumers, the prospects for a pay-off in terms of economic development are impressive. The Ruskin Laboratory's function thus appears totally consistent with the intent of Congress in enacting section 793 of the 1996 Farm Bill, establishing the Fund for Rural America and setting forth the categories of assistance to be financed.

We invite you to consider our needs as you proceed with further legislation affecting research, mindful of the need we have identified and the efforts which we have made to date, with a view toward assuring that the Ruskin Laboratory is launched in a manner promising its long-term success.

Just a few decades ago, the notion of growing fish in ponds struck the average layman as pretty far-fetched. Now fish farming is a well-established segment of the food-production industry. Ornamental fish? Possibly far-fetched to some today. But not here on Capitol Hill. Ornamental tropical fish are recognized as aquaculture, their producers now eligible for disaster assistance and their production eligible for research. In Washington and in Hillsborough County, it is recognized that ornamental tropical fish production means American jobs, and that increased production would mean more jobs. But that increased production is dependent upon increased levels of federally assisted research.

We urge this subcommittee to progress to this next logical step, to facilitate increased levels of federal funding for research, and particularly research related to ornamental fish production, thus enabling an increasing number of small fish farm operators to enter the business and create more jobs in rural America.

Thank you.

hacu Hispanic Association
of Colleges and Universities

June 25, 1997

PT

The Honorable Robert F. Smith
House Agriculture Committee
United States House of Representatives
1301 LHOB
Washington, DC 20515

Dear Chairman Smith:

I am writing on behalf of the Hispanic Association of Colleges and Universities, which represents Hispanic-Serving Institutions (HSIs), to respectfully request that your subcommittee reauthorize our program on the Farm Bill.

We were very pleased that the subcommittee acknowledged the growing importance of HSIs in preparing our students for professions in agriculture by authorizing a program in the Federal Agriculture Improvement Act of 1996. Under Title VIII-Research, Extension, and Education, a new Subtitle H, Programs for Hispanic-Serving Institutions, was created to make competitive grants available to our colleges and universities. Its purpose is to strengthen HSIs' capacity to offer excellent professional programs of study in agrisciences and agribusiness to serve both the needs of American agriculture and the needs of Hispanics.

As in other professional and technical careers, Hispanics remain severely underrepresented in agriculture. Although the U.S. population is over 12 percent Hispanic, less than two percent of those engaged in agriculture-related careers is Hispanic. The USDA has made a concerted effort to diversify its outreach, and this program has USDA's full support. It helps the institutions which attract the majority of Hispanic college students to offer high-quality, up-to-date preparation for jobs which serve a national purpose. It helps our students achieve economic and professional equity. It also helps Hispanics serve the needs of their own communities.

The program allows colleges and universities to reach out to pre-college students to encourage them to excel in subjects--particularly sciences--which will gain them admission to agricultural studies. It encourages colleges to work in consortia to share expensive resources. It promotes the study of nutritional science and allows for work-study arrangements in communities where students are employed by local businesses to bring their studies into the workplace and their business experiences into their studies. It encourages leveraging of federal funds to match dollars from industry. It allows our colleges and universities to lend academic expertise to meeting local and national agricultural needs.

The authority for the HSI competitive grant program under Title VIII was for only one year. We ask that this program be reauthorized until the year 2002. We understand that Congress did not have enough time in 1996 to give the program the consideration necessary to grant a longer authority. We strongly urge the subcommittee to extend the authority so that the 1997 grant recipients can complete their projects and so that more than the current nine institutions can benefit.

We would be happy to offer a witness for the July hearings on Title VIII, and to furnish you with more information about this program.

Sincerely,

Antonio R. Flores
President

ARF/ib

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IFT
INSTITUTE OF FOOD TECHNOLOGISTS
THE SOCIETY FOR FOOD SCIENCE AND TECHNOLOGY

ROBERT E. SMITH / *President 1996-97*

July 29, 1997

Mr. Russell Laird
Staff Director
Subcommittee on Forestry, Resource Conservation, and Research
Committee on Agriculture
United States House of Representatives
Room 1336, Longworth House Office Building
Washington, D.C. 20515

Dear Mr. Laird:

The Institute of Food Technologists (IFT) appreciates Rep. Combest and Rep. Dooley's invitation to comment on reauthorization for agricultural research, education, and extension programs. IFT, the society for food science and technology, has 28,000 members who work in the food system.

As the subcommittee engages this issue over the next few weeks, we urge that they consider the following points. Further detail is contained in the enclosed document.

- Food science and technology-related research is critical to maintain and enhance the total food and fiber system. A greater share of agricultural research investment should address the processing of agricultural raw materials into value-added foods.
- Interdisciplinary, mission-linked research teams should be funded as a means of tackling complex agricultural issues.
- Research funding should be based on scientific merit and peer review, and the National Research Initiative Competitive Grants Program should be fully funded.
- Federal research programs that match public funds with private resources should be encouraged.

Thank you for considering our views during the discussion on reauthorization legislation. IFT is pleased to continue to work with the committee on these issues.

Sincerely,

Robert E. Smith

Robert E. Smith, Ph.D.
IFT President, 1996-97

Encl.

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Institute of Food Technologists

Comment on Reauthorization for
Agricultural Research, Education, and Extension Programs
To the Subcommittee on Forestry, Resource Conservation, and Research
Committee on Agriculture, U.S. House of Representatives

July 29, 1997

■ *Food science and technology-related research is critical to maintain and enhance the total food and fiber system. A greater share of agricultural research investment should address the processing of agricultural raw materials into value-added foods.*

Strategic investment in food and fiber research must be sustained across the entire spectrum of the agricultural system, including adequate funding for food science and technology research.

One such value-added research priority is increased investment in food safety research and technologies to safeguard the nation's health and food quality, as outlined in the President's recent interagency strategy to prevent foodborne disease. Innovative strategies to conserve water and energy consumption in processing are needed to diminish the environmental impact and cost of food and fiber processing. In addition, we need continued investment in agricultural biotechnology to develop safer alternatives to chemical pesticides.

Investment in value-added research generates new markets for U.S. food products, increases exports, creates jobs and gives the U.S. a competitive advantage in the global market. Thus, funding of food science and post-harvest technology-related research projects is critical for maintaining the viability and competitiveness of U.S. agricultural products.

■ *Interdisciplinary, mission-linked research teams should be funded as a means of tackling complex agricultural issues.*

IFT believes that allocating research dollars according to whether the research is "basic" or "applied" misses the most appropriate questions and constrains research that eventually gives rise to solutions. We encourage the subcommittee to foster scientific excellence throughout the continuum from fundamental to applied research.

Higher priority and incentives should be given to research that integrates disciplines, crosses state borders, and links basic and applied research. While individual investigator projects are appropriate for many areas, interdisciplinary, mission-linked research teams may be the only successful way to tackle complex agricultural issues that entail production, environmental, health, and safety issues, and that require expertise from many disciplines.

■ *Research funding should be based on scientific merit and peer review, and the National Research Initiative Competitive Grants Program should be fully funded.*

The allocation of research funds among intramural, formula, competitive grants, and special grants is highly controversial. Competitive research grants provide the most effective, efficient, and economic return to the public. IFT strongly supports the competitive grants process, as embodied in the USDA National Research Initiative (NRI) Competitive Grants Program. An open, merit and peer review process, applied as extensively as possible throughout the research system, is the preferred way to allocate research funds among qualified contenders. Stakeholder input is appropriate in setting priorities and reviewing programs rather than in reviewing research projects for funding decisions. Research projects should be peer reviewed.

IFT strongly supports funding the NRI at the $500 million level originally envisioned. More adequate funding of the NRI would strengthen the commitment of USDA to the competitive merit review process, provide funds for fundamental research with long term potential for new discoveries, and more adequately sustain key areas of food and fiber research. Diversion of NRI funds to non-research activities, such as information dissemination, would seriously erode an excellent program that is already seriously underfunded.

IFT recognizes the importance of formula funds in leveraging state research dollars, offering flexibility in targeting research investment to regional or local needs, and in sustaining the research, education, and training activities of land grant colleges and universities. Research funding, however, should be allocated to qualified researchers according to identified priority research needs, not on the basis of population or agricultural production.

Special grants and earmarked research funds often are awarded less according to research need, priority, or merit than by political expediency. Thus, they can undermine the integrity of agricultural science and its research system. As a proportion of total research funding, their share should be minimal. Special grant funds do have the advantage of being flexible enough to meet urgent needs. At a minimum, special and earmarked grants should address priority research needs and be awarded on the basis of scientific merit and peer review.

- *Federal research programs that match public funds with private resources should be encouraged.*

Although private sector funding for agricultural research at land grant universities has increased, these funds typically support only applied, short-term research that quickly will provide the sponsor with information that gives a competitive advantage in a particular market. Agriculture, however, needs a mixture of applied, short-term research and fundamental, long-term research that may be high risk or high cost. The private sector cannot afford to fund the latter type of research. Public sector funding is needed to continue support of basic, long-term research that has regional or national interest.

In addition, IFT sees the need for more creative funding strategies, such as emphasizing programs that match federal funds with those from state, local, or private sources, as a complement to other federal programs. State-federal partnerships should be encouraged to pursue research and development that could stimulate economic development in a given region. In private-public partnerships, industry is encouraged by a mutual investment that increases the value of the industry-provided dollars. Research funded by these private-public partnerships will enhance the global competitiveness of sectors of U.S. industry.

Testimony
Before the House Agriculture Subcommittee on Resource Conservation, Research, and Forestry on Federally Funding Agricultural Research, Education, and Extension Programs

Barbara S. Stowe, Dean
College of Human Ecology
Kansas State University

U.S. Agriculture in the 21st Century - Twentieth Century agricultural research, education, and extension made possible abundant food and fiber of the highest quality produced, now, by only 2% of the population. Not only can American farmers feed and supply fiber to a growing U.S. population, it can produce enough to market abroad.

Research and Education in the next century is needed to maintain high agricultural quality and productivity, but also to:

- **Reduce Inputs**. Produce high yields with less water, fertilizer, pesticides, and herbicides. Use technology to enhance precision farming but at affordable costs. Produce livestock efficiently under conditions which support animal welfare.
- **Add Value.** Convert plant and animal products to uses beyond traditional food and fiber needs. New products from renewable extracts can be readily available and are biodegradable. Conversion of agricultural products to new uses creates new industries which employ displaced farmers in rural communities. Research and development of new products should be the work of agricultural and food scientists because they already understand the basic nature of the raw materials, and with appropriate support, can apply that knowledge to new product development.
- **Assure Compatibility Between Agriculture and the Environment**. When 2% of the population is engaged in production agriculture the other 98% may expect the bounty but have little interest or appreciation for what is required to produce that bounty. Urban office workers want recreation in natural beauty, but not next to a feedlot. Agricultural/environmental compatibility is a critical issue to be resolved in the next century. It will require interdisciplinary work of agricultural, natural resource, and social scientists to resolve.
- **Understand Consumer Driven Markets**. The last century was marked by advancements in production, followed by creation of markets for the agricultural products. It also was a time when much food and many household goods and services were produced within the home. Twenty-first century lifestyles will require prepared, packaged meals and readily available, ready to use good and services for sale in the U.S. and abroad. Successful agricultural research and education will invest resources in product development which better meets consumer needs and interests worldwide. Producers can expect to reduce overhead costs if they understand consumer needs and interests as part of the product development process.
- **Invest In Nutrition Research and Education**. The availability of a quality food supply will not be sufficient to meet consumer needs in the 21st Century. Health maintenance and reduced healthcare costs require a far better understanding of the interaction of nutrients and the body at all stages of the lifecycle. Genetic mapping and biotechnological advances have made a far better fundamental understanding of nutrient metabolism possible. Nutrition researchers who team with researchers in food production will greatly advance our knowledge of what is required to create a food supply which can sustain a healthy population.
- **Assure A Safe Food Supply**. Food products, many ready to serve, and shipped around the world are subject to contamination at myriad points: on the hoof, in the poultry pen, in the field, in processing, in shipping, in storage, in preparation, and finally when eaten. Consumer demands for variety and easy availability of foods vastly increases points at which food can become contaminated. Protecting health and food markets requires a great investment in understanding how food can be made safe and assuring that it is.

- **Assure An Educated Workforce For Emerging Agricultural Industries** The 2
Century will require different skills to sustain the agricultural enterprise than did the 20th
small cadre of technologically literate farmers will produce food and fiber from the land. A m
larger contingent will make and market new products from agriculture and natural resour
Others will be researchers and educators studying ever more deeply the nature of food and fi
in relation to human needs and interests. Extension educators will be in ever greater deman
help sustain rural families and communities in great transition, to translate technical nutrition
food safety research into practical use, to assist development of value-added industries in lo
communities, and to assist decisionmakers in balancing environment and agriculture needs.
- **Recognize and Support the Changing Role for Extension** The work of
Extension Service has been challenged as no longer meeting the needs of farmers and ru
communities. In fact, it is responding very effectively, but the needs have changed.

  For example, a survey of 500 Kansas citizens conducted by an independent agency revealed t
71% of respondents deemed KSU research and extension from very to extremely use
Eighty-five percent of the sample approved or strongly approved use of public funds for resea
and extension. Half to two-thirds of the Kansas sample were interested or involved in progra
in health and safety, family skills, community development, environment preservation and yo
development. Less than 15% were involved or interested in programs related to farmi
ranching or agribusiness. Of the sample of 500 respondents, 31% were at least somew
involved in farming, ranching, or agribusiness. These findings are similar to those found
other states. It must be recognized that extension is valued and needed, but programming ne
are shifting to support for the families and communities of the agricultural commun
Information for production agriculture is obtained directly from state specialists or other sourc

Systems in Place

In the 19th Century, Congress passed the Morrill Act, the Hatch Act, and later the Smith-Lever A
creating the land grant university system, agricultural experiment stations, and the extension servi
respectively. A system of partnerships (federal, state, and local government) was then engaged
research, higher education, and extension education. No other arrangement has ever so successfu
linked the needs and interests of the population with research and higher education of the university.
system is valid and effective today, but the issues are changing what the system must address. We u
the Congress to maintain the system but insist that the priorities for research and education addr
contemporary and projected needs, a number of which are outlined above.

Through the National Agricultural Research, Extension, Education, and Economics Advisory Board
Government Performance Review Act, the public needs and interests for USDA expertise and servi
can be addressed and the return on investment assessed and documented.

Meeting the needs and interests in support of the emerging agricultural enterprise will require a broa
base of support within land-grant universities. Expertise beyond colleges of agriculture must be tapp
including colleges and departments of human sciences, biology and natural resources, veterin
medicine, forestry, business, rural sociology, and others.

In Conclusion

With the support of Congress, the U.S. agricultural enterprise will flourish and continue to br
prosperity to the country, but only if it appropriately assesses the needs and interests of contempor
societies at home and abroad and acts upon them. The system of federal, state, and local governme
partnering to conduct research, higher education, and extension is valid and efficient and will remain
if it addresses demonstrated human, scientific and economic need.

Thank you for the opportunity to comment.

AGRICULTURAL RESEARCH, EXTENSION AND EDUCATION CONSIDERATIONS FOR 1997 REAUTHORIZATION POSITION STATEMENT SUBMITTED BY NATIONAL COTTON COUNCIL OF AMERICA

Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
July 22, 1997

Publicly supported agricultural research, extension and education programs are fundamental components that contribute to the enviable position of the US as a world agricultural leader. By taking optimum advantage of modern technologies created in public and private laboratories, production agriculture is providing consumers with a safe, affordable, and abundant supply of food and fiber. With fewer and fewer citizens involved in agriculture, the public becomes increasingly vulnerable. The best way to counter that vulnerability is to maintain a diverse research system -- a diversity of research participants, including both public and private, and a diversity of funding mechanisms including formula, intramural, and competitively awarded grants.

A viable agricultural production system meets critical social and economic needs, providing nearly 20% of US jobs, generating more than one trillion dollars in economic activity, and accounting for 16% of the gross national product. Agricultural research is essential to maintain these public goods, benefiting everyone with better food, clothing, and recreational opportunities. US farmers and ranchers are concerned caretakers of the nation's natural resources and are guardians of much of our environment.

Agricultural technology is dynamic. As farmers must change and adapt to new demands, the research and extension system likewise must be flexible. While the principles creating federal support for agricultural research and extension are as sound today as they were when first created more than 120 years ago, continual review of the Research Title of the farm bill is appropriate.

Assuring stakeholder involvement in the planning phase of research and extension activities is important, especially those efforts that emphasize active participation from producer groups. Involvement of producers is the most important single input since it is their investment in capital, expertise management, and assumption of risk which provides the conduits in which benefits flow to the public.

We support the concept of a strong state-federal partnership with a strengthened alliance with the private sector. We also favor a balanced approach to funding with real growth of base funding which supports the research and extension infrastructure, in-house ARS resources which are targeted to national and regional needs, and competitive grants to address some of the longer-term basic research needs. We also support efforts to improve the efficiency of the competitive grants process. And finally, we favor continuing efforts to assure accountability of public research institutions to the public.

The pressures facing US agriculture are substantial. Safety nets are being dismantled. Producer risks are increasing. Competition is tougher, especially from subsidized economies. As the challenges facing US agriculture continue to increase, the need for excellence in research, extension and education is as great now as ever before.

AAHS Association of Administrators of Human Sciences in NASULGC
BOHS Board on Human Sciences

STATEMENT FROM THE
BOARD ON HUMAN SCIENCES
NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND GRANT COLLEGES
TO THE
SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION, AND RESEARCH
HOUSE AGRICULTURE COMMITTEE

The Board on Human Sciences (BOHS) of the National Association of State Universities and Land Grant Colleges (NASULGC) represents educators, scientists, and administrators who are concerned with some of the most critical issues facing our nation-health and nutrition, food safety, family self-sufficiency, promoting the well-being of children and youth, and improving the productivity of the workforce and the economic viability of businesses in rural communities.

BOHS has been involved in the Title VIII Coordinating Committee of NASULGC and in general, supports the position of the committee. BOHS as a constituent member of the boards which comprise the Title VIII Coordinating Committee, would like to take this opportunity to highlight some of the issues in the reauthorization of the research, extension and education title (Title VIII) of the Farm Bill that are of greatest concern to us, particularly as they relate to food safety, nutrition, children, family, and community issues.

BREADTH OF MISSION

BOHS is greatly concerned over the attention given to what appears to be a narrowing of the focus of research and extension to production agriculture to the exclusion of consumers' needs. While there is substantial ambiguity in the term "production agriculture," many interpret it as the application of technical research to crop and livestock production. However, if the agricultural enterprise is to continue to flourish, it must be concerned with the social and economic issues of those who support the agricultural enterprise-its employees and its consumers.

The human sciences component of the Cooperative Extension Service has the responsibility for educating consumers to make sound decisions, improving the health and well-being of children, youth, and families, and strengthening rural as well as urban communities. These programs reach millions of U.S. citizens each year and result in taxpayer savings and increased profits for entrepreneurs. Some examples of extension efforts follow:

- Kansas State University Extension specialists have been working with processors to teach them about safe handling practices for their produce, food safety tips, and the latest in labeling, packaging and marketing techniques. This program has assisted over 1,000 processors annually since its inception in 1994.
- In Oklahoma, the $40 per family per year investment by Extension and Women, Infants, and Children (WIC) nutrition education programs is considered a bargain-especially when compared to keeping a low-birthweight baby in prenatal intensive care at $1,000 a day.
- Oklahoma's Home-Based Business Program, initiated in 1985, has reached more than 20,000 people. Oklahoma home-based businesses generate an estimated $3.2 million a year. Similar programs and results are present in Nebraska, Iowa, and Minnesota, among other states.
- Efforts to boost childhood immunizations in Texas resulted in an increase of 21,000 two-year-olds receiving shots.
- Extension specialists in New York and New Jersey teach householders to save and manage their money for life needs and decisions through *Money 2000*.
- The Purdue Extension staff designed a nutrition education program for teenage mothers, who have a high rate of babies with low birthweights. More than 5,000 mothers and their infants have benefited directly, saving Indiana taxpayers $3.12 million in Medicaid costs. Reduced illnesses will reduce costs to both the family and the taxpayer.

Many of these programs reach at-risk communities by using partnership efforts with private companies and other agencies. They have immediate, cost-saving benefits.

A SYSTEM IN PLACE

As a system already in place, the Extension Service has networks reaching families and community members in most counties in every state. Concurrently, it links Land Grant Universities together creating an established network that makes outreach and education efforts very cost-effective with flexibility for quick response to local needs.

Extension funding leverages state, local, and private resources—in some cases on a 10:1 ratio. An argument could be made that if federal funding is such a minor component, why is it needed at all? Without it, other investors would be less likely to contribute funding. Continuing federal funding provides a coordinated effort, allows sharing of information across states, and reduces duplication.

STAKEHOLDER INPUT

Universities have long recognized the importance of stakeholder input and the networks with both federal and state partners. Therefore, all Land Grant Universities employ numerous advisory committees to advise on critical local and state issues in an effort to help establish priorities. For example, universities have program development committees, advisory committees for both research and extension, and statewide stakeholder input into the development of strategic plans. In Virginia, for instance, a network of local Extension leadership councils identifies local priorities, and it is critical for determining programs.

The converse is also true. For example, in Nebraska extension specialists serve on the governor's advisory committees for the protection of children, health policy issues, and WIC/Food Stamp. This reciprocity in advisory, educational and service roles is the core of the efficiency in use of public funds.

The 1996 Farm Bill established the National Agricultural Research, Extension, Education, and Economics Advisory Board (NAREEEAB) to set national priority areas. As such it provides monitoring priorities between and among the states and their federal partner.

Representation of NAREEEAB and other advisory boards must reflect constituents, which means extending representation beyond producers and university administrators. Representation should include appropriate proportions of producers, industry, and consumers.

FUNDING MECHANISMS

Funding must respond to both national and local (state) priorities if it is to serve constituents' needs. States and local communities have the responsibility for fine-tuning federal priorities to reflect local needs. Responding to critical issues in the state is crucial for that particular state and the institutions located within. In addition, many of these issues are likely to affect other states, and often they affect the economic and social well-being of the nation. The nationwide network of the Extension Service allows quick and efficient responses to issues arising across the country. There are advantages to funding both state and federal priorities.

- Early research efforts in nutrition education in Pennsylvania have become a springboard for changing the nutrition patterns across the nation.
- Work by Extension programs in Missouri in 1993 provided a base for work in North Dakota in 1997. These programs have evolved with each new Extension program enhancing the efforts of those before them.
- Research efforts in Iowa, Minnesota, and Nebraska in the early 1980s have been the basis for rural entrepreneurship across the nation.

Concurrently, there are advantages to using a combination of competitive and formula funds to meet the needs of society. Competitive grant funding is a valuable way to assure peer reviewed, high-quality programs. Formula funding is an efficient way to assure staff and infrastructure from which quality competitive proposals arise. Together they create a dynamic system which optimizes continuity, change, and flexibility in serving the people of the nation, people with diverse needs and resources.

CONCLUSION

Mr. Chairman and Members of the Committee, the Board on Human Sciences appreciates your past support, and we thank you for the opportunity to provide our comments on this important endeavor.

STATEMENT OF GARY JACKSON, NATIONAL DIRECTOR OF FARM*A*SYST, B142 STEENBOCK LIBRARY, 550 BABCOCK DRIVE, MADISON, WI 53706 PROVIDING INFORMATION ABOUT FARM*A*SYST/HOME*A*SYST SUBMITTED TO HOUSE SUBCOMMITTEE ON FORESTRY, RESOURCE CONSERVATION, AND RESEARCH IN CONNECTION WITH HEARINGS ON AGRICULTURAL RESEARCH AND REAUTHORIZATION

Thank you for the opportunity to submit a written statement to the Subcommittee on the vital question of of agricultural research, and applied application of research through extension education. With its strong emphasis on partnership-building, the Farm*A*Syst/Home*A*Syst program is an example of a research based action program that serve the needs of farmers and consumers. This program builds private/public partnerships that assist producers in taking voluntary actions that prevent environmental problems.

Background

The Farm*A*Syst/Home*A*Syst Program was created through grant funding as part of the USDA Water Quality Initiative. The program's mission is "To facilitate state and local programs that enable rural and urban landowners and residents to identify environmental risks on their properties and take voluntary action to prevent pollution." A "hand shake" agreement has facilitated joint funding of this innovative program by the Cooperative State Research and Extension Service (CSREES), Natural Resources Conservation Service (NRCS), and the U.S. Environmental Protection Agency (EPA). As a result of cooperative efforts, the program has been expanded nationwide and has met with substantial success. Over 42,000 voluntary farm pollution risk assessments have been conducted and participants have invested more than $30,000,000 to take actions that will prevent pollution. This program has been recognized for its outstanding contributions by both the environmental community, (National winner of the Renew America Pollution Prevention Award, 1996) and the agricultural community, (recipient of the 1997 USDA Secretaries Honor Award and the 1996 Educator of the Year Award from the Mid America Crop Protection Association). More importantly, this voluntary, confidential approach to identifying site specific pollution risks and assisting individuals in taking voluntary pollution prevention actions has proven itself to be acceptable to farmers, ranchers and home residents.

As a result of its acceptance, the original farmstead assessment has been expanded into a total farm/ranch assessment. The program has served as a model for the development of the Ontario Environmental Farm Plan and the draft total resource management plan developed by the NRCS and the National Association of State Departments of Agriculture (NASDA). A Spanish version and a version for limited

BEST COPY AVAILABLE

resource farmers have also been developed.

Efforts are currently underway to assist interested commodity organizations in developing commodity specific risk assessments which they will encourage their producers to use. These assessments are being designed to assist producers in understanding pollution risks around their buildings as well as those related to crop production. The crop production assessments are being designed to aid producers in evaluating the extent of their use of integrated pest management (IPM) technologies and practices that are components of precision agriculture. These crop production assessments will assist producers in making voluntary decisions that will reduce pollution risks or prevent pollution. They will increase knowledge about the components of precision agriculture and IPM and aid producers in evaluating the use of these technologies in their operations.

Public/Private Partnerships

The Farm*A*Syst program is based on developing interdisciplinary, interagency and private sector cooperation to tailor programs and assessment materials to meet local needs. This approach is producing the cooperation that is necessary to support local and individual actions that prevent pollution and protect drinking water sources. The addition of the Home*A*Syst program provides for a balanced approach to evaluating pollution risks by identifying risks on both farm and non-farm properties. This increases local acceptance because everyone is being asked to evaluate their activities and take actions to prevent pollution.

During Subcommittee hearings last July, Dr. Bob Robinson of CSREES singled out Farm*A*Syst/Home*A*Syst as one of two efforts that bridged the gap between research and applied programs:

"Another notable example of a decision aid to help farmers is Farm*A*Syst, which is used to assess farms and farmsteads for potential pollution problems. Private landowners have completed more than 30,000 assessments with Farm*A*Syst, and, as a result, have invested more than $24 million in pollution prevention practices."

With farm assessments now exceeding 42,000, expenditures for pollution prevention practices will exceed $30 million dollars. Few programs can boast of a return on investment as high as this, but this is only one measure of the program's success.

Farm*A*Syst/Home*A*Syst has forged impressive connections with the private sector and its leadership in partnership-building can serve as a model for agriculture research and Extension activities. Dean Kleckner, president, American Farm Bureau Federation, explains how the program complements the private sector's efforts to promote voluntary action:

> "Active involvement of agribusinesses in the delivery of the Farm*A*Syst pollution risk assessment and/or active participation by agribusinesses in marketing pollution prevention products and services is the next logical step beyond the awareness and education programs used by Farm Bureau."

Partnerships with the Farm Bureau have been critical to Farm*A*Syst/Home*A*Syst implementation in several states. In Michigan, Farm Bureau used its publications to educate farmers about the utility of the program. In Louisiana, the Farm Bureau supported the Farm*A*Syst delivery and an accompanying benefit-cost study to verify the effectiveness of the program. That study showed that Louisiana farmers, motivated by assessment results, voluntarily invest an average of $700 per farm (63 percent of which is their own time and effort). For each tax dollar spent by state programs, the study also showed that there is a return of $3 to $9 in pollution prevention benefits.

Tom Van Arsdall, Vice President of Environment, National Council of Farmer Cooperatives sees Farm*A*Syst/Home*A*Syst as a vehicle to forge productive partnerships.

> "[N]ow farmers are turning increasingly to cooperatives for assistance in the face of growing environmental pressures. That's why we are excited about the Farm*A*Syst program. It provides an opportunity for the agricultural community to pull together and help farmers pursue voluntary, cost-effective solutions when responding to environmental challenges."

Working with cooperatives in Wisconsin, Farm*A*Syst/Home*A*Syst carried out a project to reach new audiences in an effort to prevent pollution from petroleum storage. The project used the local marketers who sell petroleum products to distribute information about environmental risks associated with petroleum storage.

Farm*A*Syst/Home*A*Syst has forged links with industry to promote pollution prevention. These include partnerships with the Pork Producers Association to develop an industry-specific risk assessment--the Pork Environmental Assurance Program; Wisconsin Vegetable and Potato Growers Association, Wisconsin Corn and Soybean Growers Program, and Certified Crop Advisers Program to develop and field test commodity-specific environmental assessment tools; Arkansas poultry producers to develop poultry-related assessment tools to meet the needs of local farmers; and, the South Dakota Cattlemen's Association to develop a customized program delivered to ranchers by a private consultant paid $100 per assessment. These partnerships combine the expertise of industry with the latest research in pollution prevention to produce decision aids that benefit farmers and consumers. Interest in this cooperative approach continues to grow.

Farm*A*Syst/Home*A*Syst was co-founders of the Partnership for Pollution Solutions (PPS). This cooperative effort among diverse private and public organizations with long-term interests in agricultural issues included representatives from the Farm*A*Syst/Home*A*Syst program, Tennessee Valley Authority, U.S. EPA, Ground Water Protection Council, AgriBank (Farm Credit Bank), Conservation Technology Information Center (CTIC), The Groundwater Foundation, National Association of Conservation Districts, Agricultural Compliance Assistance Center, National Rural Water Association, Michigan Department of Environmental Quality, Cargill Hybrid Seeds, American Farm Bureau Federation, Iowa Farm Bureau, and North Central Regional Center for Rural Development. One of the goals of the partnership was to recognize and support private initiatives that address environmental issues in agriculture. To this end, PPS prepared a model directory that highlighted the efforts of 32 innovative programs supported or sponsored by the private sector. The work products of PPS can be viewed at http://www.wisc.edu/farmasyst/private/part.html. Relationships nurtured in PPS have produced other useful collaborations. For example, Farm*A*Syst/Home*A*Syst is a partner in a CTIC sponsored National Water Quality Watershed Project Symposium in September, 1997
Farm*A*Syst/Home*A*Syst shows how Land Grant Colleges and the Extension are not waiting for changes, they are demonstrating leadership in organizing inter-disciplinary research and programming that directly benefits farmers. It is a model for environmental programming that enables farmers to responsibly manage their land without losing their competitive edge in the marketplace.

Future Needs

Environmental pressures on agriculture will continue to grow. The source water protection program in the Safe Drinking Water Act requires states to develop Source Water Protection Plans. These plans will identify risks associated with agriculture, but provides no mechanisms to assist private well users in protecting their source of water. The program currently does not provide mechanisms to assist producers in identifying risks on their property or in taking voluntary actions to reduce high risks that are identified. The program provides mechanisms to assist cities in protecting their sources of drinking water, but support for small rural communities is very limited. The EPA identifies agriculture as the largest source of nonpoint source pollution. They identify pollution prevention as the most cost-effective approach to dealing with pollution, but no program is currently available to support pollution prevention efforts for agriculture.

The Farm*A*Syst/Home*A*Syst Program can fill voids in EPA's and State's environmental programs and do it in ways that build on the existing USDA and private sector frameworks. For this to occur base support is needed for programs that have been established in every state. A funding mechanism similar to the one established for the National Agricultural Pesticide Impact Assessment Program is needed to build future stability for this program. This support will provide for development and use of the most cost-effective approach to addressing environmental risks associated with agriculture -- voluntary pollution prevention delivered through an effective public/private partnership.

More information on the Farm*A*Syst/Home*A*Syst program is available on the programs home page at: http://www.wisc.edu/farmasyst.

Thank you for considering the Farm*A*Syst/Home*A*Syst program in your REE re-authorization discussions. If you have questions or desire additional information, please contact:

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August 15, 1997

Mr Larry Combest and Mr Cal Dooley
Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
United States House of Representatives
Room 1301, Longworth House Office Building
Washington, DC 20515

Dear Mr Combest and Mr Dooley,

Thank you for the opportunity to provide input on the research title of the Farm Bill As I discussed with your full committee in June of this year, one area of forest policy where the federal government can be most effective is in providing timely data in a useful format on the forests of the nation The Forest Inventory and Analysis (FIA), as presently funded and administered, does not accomplish this goal as well as it could It has been well over ten years since FIA data was available for New Hampshire, and we don't expect a full report to become available for over a year The hoped-for fourteen year FIA cycle that New Hampshire and other Northeastern states operate on simply does not meet our data needs

For every forest policy issue addressed on a national, regional or state level, accurate data on a consistent cycle is crucial I urge you to use this opportunity of revising the research title to shorten the FIA cycle to five years nationally This information, more than any other, will help address forest policy issues in a manner that is supported by the facts Further, it will provide landowners, industries and citizens a clearer picture of what can realistically be expected from our forests

If you would like to discuss how FIA may be changed to improve our understanding of the forest resource, please do not hesitate to have your staff contact me I appreciate this opportunity to provide input, and look forward to working with you in the future

Sincerely,

Eric Kingsley
Executive Director

REPRESENTING THE FOREST LANDOWNERS AND FOREST INDUSTRY OF NEW HAMPSHIRE

CHARLES R. KRUEGER
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The request is to include language in the House agriculture bill, possibly in the precision agriculture section, that would encourage the Secretary of Agriculture and the Administrator of NASA to enter into an agreement to promote cooperation and coordination within and between the two organizations in the research, development, and application of geospatial technologies (remote sensing) in the areas of agriculture and natural resources.

This language would be similar to that in the Senate bill which sites the current agreement between the Secretary of Agriculture and the Secretary of Energy regarding precision agriculture partnerships.

There is interest on the part of the current leadership of both organizations to formalize such an arrangement. If this language were included, it would facilitate the transfer of this important technology for the benefit of a significant number of users.

AMERICAN SOCIETY OF AGRONOMY
CROP SCIENCE SOCIETY OF AMERICA
SOIL SCIENCE SOCIETY OF AMERICA
677 South Segoe Road • Madison WI • 53711 • (608) 273-8080 • FAX (608) 273-2021

15 August 1997

Russel Laird, Staff Director
Subcommittee on Forestry, Resource Conservation, and Research
Committee on Agriculture
United States House of Representatives
1336 Longworth House Office Building
Washington, DC 20515

Dear Mr. Laird:

Pursuant to receipt of the July 8 letter from Congressmen Combest and Dooley, the TriSocieties (American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America) express our appreciation to the Congressmen and your Subcommittee for the request for our opinions regarding reauthorization of the Research and Education Title of the 1996 Farm Bill. The Tri-Societies have a membership of more than 11,000 individuals in both the public and private sectors. A major goal of the Tri-Societies is to promote effective agricultural research. With such a goal, the upcoming reauthorization of the Research and Education Title is of the greatest concern and interest to our Societies.

We realize there are numerous issues you must consider in this reauthorization process. We would like to address two of those issues - priority setting and research funding - which are most important to our Societies.

In these times of budget restraints and demands for accountability, priority setting for agricultural research is very important. **We strongly support a "bottom up" or grass-roots approach to priority setting for agricultural research.** Agricultural research that is conducted by USDA and the Land-Grant Universities serves a number of clients and customers including farmers, processors, commodity groups, farm groups, agribusiness, environmentalists, and public interest groups. A bottom up approach requires input from all these sectors to identify the needs and issues to be addressed and to develop a consensus and a context for a national priority system. Priority setting must have a planned balance for involvement of expertise levels. For example, a particular problem or question may be viewed as high priority by farmers, or by an agency such as US EPA, but scientists may know that answers already exist or can be deduced from existing information. In contrast, a group of scientists and agency individuals may overlook needs deemed important by consumer groups or agriculture producers.

We fully endorse the process of FAIR'95 and CROPS'99 for setting priorities. The FAIR'95 process was developed by the Federation of American Societies of Food Animal Sciences (FASFAS) and the Forum for Animal Agriculture through the conduct of a national workshop, the Food Animal Integrated Research for 1995 Symposium (FAIR'95). Participants included scientists, food animal producers, commodity associations, aquaculture specialists, and consumer, environmental, and animal well-being advocates.

The Tri-Societies, along with several other organizations, are currently implementing a similar process for plant research. The Coalition for Research On Plant Systems (CROPS) consists of farm and commodity associations and professional and scientific societies. Its mission is to address, communicate, and encourage the establishment of agricultural research needs and priorities, as well as for related extension and education issues. A national workshop in November 1997, CROPS'99, will bring together representatives of all the stakeholders in crop production, including scientists, producers, food processors, and consumer and environmental advocates, to achieve a consensus on national research priorities for crop and plant research.

Once needs are identified, the National Agricultural Research, Education, and Economics Advisory Board should be responsible for seeing that these needs are addressed. This process would reduce the need for stakeholder advisory boards, which have been suggested. Such boards would prove costly, repetitive, and inefficient.

The Tri-Societies endorse a broad portfolio of research and education funding mechanisms and options including intramural and formula funds, as well as competitive and special grants. Each of the current funding mechanisms fulfills certain needs and allows the system to remain flexible. The intramural funds are used for basic and applied research and to fulfill the needs of USDA regulatory agencies. Formula (base) funds are used to support research that is more site- or region-specific and provide a base of support that allows flexible and rapid response to emerging needs, and in so doing, helps achieve national goals. Even though these funds are thought of as local or regional, most research results are applicable over large regions or the whole country. We believe the allocation formula should be reviewed to accurately reflect changing demographics and shifts in food and fiber production.

The USDA-NRI competitive grants provide for basic research and long-term efforts that are primarily high-risk but high return. A high priority should be given to increasing the National Research Initiative to the $500 million level authorized and justified by several studies. The Fund for Rural America is focused on integrative programs that apply the research to practical problems and systems. **We support and encourage an extension of the research portion of the Fund for Rural America.** Special grants provide a mechanism for rapid response to emerging situations which might not always be predictable, such as the appearance of new plant or animal diseases. We support the awarding of these grants through the merit review process.

Research proposals must be selected through a scientific merit review process. We suggest a revision of the research grant proposal process. One possible revision would be to require USDA to establish a pre-screening process for abbreviated proposals. A simple form could be used to determine relevance and fit into national priority needs. If so, the researcher would be requested to complete a more thorough grant proposal for peer scientist review.

U.S. agriculture must have a productive research system. To achieve this, we must place more emphasis on goal and priority setting, with funding provided to meet the goals. Involving the diverse stakeholders in the priority setting and industry in the funding of research will allow increased efficiency in use of public funds.

Again, we thank you for the opportunity for input into this reauthorization process. If our TriSocieties can be of any further assistance to you and your subcommittee, please feel free to contact me at (608) 273-8090, extension 308.

Sincerely,

Robert F Barnes

Robert F Barnes
Executive Vice President

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July 10, 1997

The Honorable Larry Combest, Chairman
The Honorable Calvin M. Dooley, Ranking Minority Member
Subcommittee on Forestry, Resource Conservation, and Research
House Committee on Agriculture
Room 1301, Longworth House Office Building
Washington, D.C. 20515

Dear Congressmen Combest and Dooley:

I am responding to the letter inviting Dr. Katherine R. Smith, former director of the Policy Studies Program at the Henry A. Wallace Institute, to offer testimony to the Subcommittee regarding agricultural research, education, and extension programs. I replaced Dr. Smith as director in July, 1996, and am pleased to submit the testimony. We applaud your efforts in conducting a timely review of these programs, and greatly appreciate your invitation.

We respectfully make three recommendations:

1. Dedicate specific funding to an improved research accountability system.

2. Target increased research and extension funding for the expanding set of environmental requirements that farmers and ranchers face.

3. Establish a national commission on extension to assess innovative reforms occurring across the country in safeguarding the sustainability of agriculture.

The recommendations are grounded in the best available science on these issues. Their adoption will do much to assure the long run health of U.S. agriculture and rural America.

Two copies of the testimony are enclosed. Please do not hesitate to contact me if you have questions or wish to discuss any of these points in further detail.

Sincerely,

David Ervin

David E. Ervin, Ph.D.
Director, Policy Studies Program

Enclosures

Recycled paper

Testimony to the House Committee on Agriculture, Subcommittee on Forestry, Conservation and Research

July 11, 1997

Improved Agricultural Research and Extension for Production and Environmental Stewardship

David E. Ervin, Ph.D.
Director, Policy Studies Program
Henry A. Wallace Institute for Alternative Agriculture[1]

Chairman Combest and Congressman Dooley, thank you for the invitation to submit testimony on agricultural research, education, and extension programs. We applaud you for conducting these timely hearings. Public agricultural research, education, and extension play critical roles in shaping the future of agriculture, rural areas and our nation's environmental health. The historic changes about to unfold under the Federal Agriculture Improvement and Reform Act make decisions about federal policy for agricultural research, education and extension even more critical than usual. This is an opportune time to review the successes and limitations of our current policies and programs to ensure that scarce federal resources serve key public needs which will not be filled by private efforts. My remarks focus on three areas: (1) accountability and priority setting; (2) structural and funding mechanisms needed to assure public goods, such as germplasm conservation and clean water, and; (3) the vital role of the Extension Service in delivering public goods.

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[1] The Henry A. Wallace Institute for Alternative Agriculture is a non-profit research and education organization. Its mission is to encourage and facilitate the adoption of low-cost, resource conserving, environmentally sound, and economically viable farming systems. In short, to foster economically, environmentally and socially sustainable agricultural systems, as Congress defined in the 1990 Farm Bill (FACTA) and the Secretary of Agriculture endorsed in 1996.

In carrying out our mission, we collaborate with numerous organizations around the country. For example, we work with the U.S. Department of Agriculture, the Environmental Protection Agency, land grant universities, scientific societies, commodity organizations, and environmental groups. Also, the Wallace Institute is just one of 500 organizations who comprise the National Campaign for Sustainable Agriculture, an umbrella organization that facilitates grassroots involvement in the design and implementation of national food policy. Many Campaign members are here today and look forward to working with the Committee as it begins the process of drafting a research title.

Principles and Observations

My testimony is guided by the following underlying principles and observations:

1. **Public research and extension can and must provide the foundation for building competitive farming and ranching systems that protect environmental resources and sustain the quality of life in rural communities.** A growing body of science and on-the-ground experience confirm that such integrated systems are technically feasible and profitable in many instances, with the potential for even wider application under more R&D. Proven technologies are available to build the systems -- integrated pest management, conservation tillage, rotational grazing, cover crops, organic production, and soil nutrient testing to mention a few. Other technologies, such as precision farming, are emerging but will not reach their full potential. Numerous barriers that limit their development and widespread adoption can be lessened by strategic public research and education.

2. **Public research allocates relatively few resources to the development of profitable and productive sustainable agriculture systems.** Estimates vary from below 10 percent up to 35 percent depending upon the criteria used. Unfortunately, present research accountability systems simply cannot produce a definitive estimate, a telling comment. This level of funding contrasts sharply with Congress' stated purpose in FACTA that the entire research title emphasize sustainable agriculture. The small amount of funding is unlikely to assure a stream of technologies capable of sustaining agricultural production and environmental quality for future generations.

3. **Public research and educational outreach should lead the development and adoption of sustainable agriculture systems because they benefit farmers, ranchers, consumers, conservationists, agribusinesses across the country, and future generations.** For example Chairman Combest, basic knowledge to improve soil quality will not only enhance Texas farmers' long-run productivity and profits, but also reduce air and water pollution from wind and water erosion. Yet, available data show that only about 12 percent of public agricultural research funds go for natural resource management purposes, and the portion for environmental purposes is unknown.

Recommendations

Improvements in the public agricultural research and extension system are possible, indeed necessary, to ensure agriculture's long-run competitiveness, enhance its environmental performance, and improve rural community well being. We respectfully recommend three actions:

- **Dedicate specific funding to build an improved public agricultural research accountability system led by USDA with full stakeholder participation.** The federal agricultural research system should make scientific estimates of the physical, biological, economic and social effects of its research projects. This accountability system will help ensure that scarce research and extension resources go to priority needs not adequately served by private markets. A promising development in this regard is the proposed work by the Council on Food, Agricultural and Resource Economics to improve research and education performance measurement. Congress should set aside increased funds specifically for work on accountability systems and establish firm delivery dates.

- **Target increased research and extension funding for environmental and other public goods.** The public has made clear in recent elections that it does not want to roll back gains in environmental quality. Farmers and ranchers need public research and educational support to lessen the costs of expanding environmental requirements. We support USDA's FY 1998 research and extension budget recommendations for increased funding for natural resource and environmental research programs. We recommend further increases in activities that interweave production, environmental and rural development elements into sustainable systems.

- **Establish a national commission on extension to assess innovative reforms across the country that can help safeguard the sustainability of agriculture.** The Extension Service holds enormous potential to accelerate the development and adoption of sustainable agriculture systems. There are many innovative programs around the country that suggest extension can assume a leading role in those efforts. We recommend a national commission of extension professionals and customers to survey promising developments and identify effective strategies for spreading the innovations.

Before examining the rationales that lead to these recommendations, it's useful to review the sea change of policies that set the stage for the next generation of agricultural research, education, and extension.

Agricultural Research Enters a Brave New Policy World

This is an opportune time to consider the agriculture research system's structure, funding mechanisms, coordination and priority setting, and accountability. The agricultural industry confronts a radically different policy world from just five years ago, one with a dramatically reduced government role in production and marketing decisions thanks to the 1996 Farm Bill, one with an expected doubling in food demand over the next thirty years, one with expanding foreign markets thanks to regional and global trade pacts, one of federal budget austerity into the foreseeable future, yet one in which the public desires more from agriculture than plentiful, low cost food and fiber.

Sustained productivity growth is essential to the long-run health of American agriculture. Farmers and ranchers will need a steady stream of productivity-enhancing R&D to remain competitive and help fill food and fiber needs around the globe. As the world's largest single grain producer, U.S. agriculture has accounted for about 18 percent of global supplies during the 1990s. The minority percentage makes clear that the rest of the world plays the major role in food production, and will continue to do so. Some contend that American agriculture should assume nearly full responsibility for feeding the world's new inhabitants over the next three decades. Science and experience suggest that this burden is neither achievable nor appropriate for the industry. Therefore an all out push to maximize production will fall clearly short of "feeding the world's population." Moreover, it will unnecessarily deplete natural resources and degrade environmental quality. Higher productivity is essential, but it's a matter of how it's accomplished. **We must fund agricultural research and extension that improve crop and livestock productivity, but do so in ways that satisfy other priority social objectives at minimum cost, such as reduced air and water pollution.**

Issues such as improved water quality, food safety, protection of biological diversity, and preservation of rural farm landscapes are increasingly entering local, state and federal agriculture policy discussions. Surveys show repeatedly that a clear majority of the public supports existing or higher environmental performance by the industry. Results of the 1996 elections confirmed that the vast majority of the public does not want to rollback environmental standards and improvements. However, they do want to find less expensive and less intrusive ways to sustain and advance them. A team of leading scientists recently identified new technology for protecting the environment and natural resources as one of the top 10 challenges facing industry over the next decade (Battelle). **We believe that federal and state agricultural research and educational outreach systems should play a lead role in assisting farmers and ranchers to deliver these public goods at low cost and in producer-friendly ways, but they have been under-utilized.**

Thus, the need for increased agricultural research and education is stronger than ever. But the purposes have broadened beyond ensuring productivity advances. The public and private research systems are introducing new technologies at a dizzying pace. Just a few months ago, we crossed the threshold of creating an exact genetic duplicate of an animal that spawned intense ethical and other issues. Clearly we have the capacity to advance science and technologies in ways that were hard to fathom just a decade ago. It is not clear how these technological advances will contribute to the overall public objectives for the agricultural system. **The incentives that drive technology innovation and adoption processes omit key public values.** Therefore, important questions arise about the priorities guiding our public agricultural research system, its accountability, and the degree to which it focuses on and delivers needed public goods using innovative research and educational outreach.

Insufficient Accountability and Priority Setting

Every good government program starts with a clear conception of a priority social problem. Then it defines the role the public sector can best play in the solution, one that will not duplicate or diminish private sector initiatives but complement them. Next, it structures necessary public institutions that focus tightly on the root causes of the problem, and that are guided by effective leaders with adequate funding. Finally, it uses regular evaluation to adapt to changing conditions and to ensure accountability to the taxpayers. Accountability processes also feed back into priority setting for the next generation of programs. Thus, the two are interlinked.

Major assessments of priority setting and accountability by the public agricultural research and education systems have not drawn favorable conclusions (GAO; NRC; OTA, 1995a). The recent National Research Council report highlighted the need for heightened accountability and quality as one of four principal areas for change. We concur with those findings, especially concerning research and education on sustainable agriculture. There are some encouraging signs of progress in remedying the deficiencies with innovative efforts in some states and a strategic planning process underway within USDA. We believe that science and research administrative practices are available to provide a better accounting to taxpayers and to improve priority setting.

As the brave new policy world continues to unfold, new criteria for success in agricultural research and education need to be added. In addition to producing food and fiber, making progress on nettlesome environmental problems such as water pollution from fertilizer and pesticide residues, improving nutrition and ensuring food safety, protecting biological diversity, and sustaining strong rural communities have entered agricultural policy debates. Many goals represent public goods that transcend market channels and therefore will not be captured by market rate of return studies. Their character complicates priority setting and accountability but need not stymie them.

The remarkable accomplishments of the Morrill, Hatch and Smith-Lever Acts in building the production capacity of U.S. agriculture have been the traditional focus of accountability studies. Study after study has concluded that the **market returns** to public agricultural research for the increased food and fiber exceeded the return for comparable research investments elsewhere in the economy. Early studies estimated returns as high as 100 percent or more. USDA's Economic Research Service has estimated a "likely" value of 35 percent (Fuglie, et al). Others arrive at a conservative figure of about 20-25 percent (Alston, Norton and Pardey). Based upon the high estimates, eminent economists studying this issue argue that the U.S. has underinvested in public agricultural research. Assuming the high returns extend into the future, the public will continue to underinvest if research expenditures do not rise.

Legitimate arguments have been made that the estimated rates of return omit important effects, some that would lower it and some that would raise it (Fuglie, et al.). Examples include health, environmental, and safety effects of new technologies. As the agricultural technology revolution expands exponentially, the omitted effects take on more importance. The omissions are of particular relevance to sustainable agriculture because one of its central goals is to use technologies that increase public goods and reduce negative side effects. There has been virtually no quantitative analysis to correct for the omissions, likely because they occur mostly outside markets. Public research and education agencies do not comprehensively monitor them. Their absence cannot be supported on scientific grounds. A growing body of science exists to measure most of the neglected impacts and place values on them.

Economists have a variety of methods to estimate the monetary value of nonmarket public goods. For example, reducing the likelihood of agricultural water pollution can be valued as the saved expense in finding other drinking water supplies or avoiding flood damages. Improved water quality may also lead to increased recreation that can be measured through surveys of fisherman, swimmers and other water enthusiasts. Even surveys of potential users of future environmental benefits, such as preserving agricultural landscapes, can give credible estimates of social benefits under carefully designed surveys. Conversely, if agricultural R&D degrades any of the public goods, the same methods should be applied to estimate the losses that lower the rate of return. Incomplete science may rule out a direct monetary measure for certain public goods. In some cases, the benefits of research may be assessed as the savings afforded by less expensive measures. As an example, research discoveries may allow farmers to meet public environmental standards, such as maximum contaminant levels of nitrates and pesticides in well water, at lower expense. The savings, while not the direct value of the improved environmental quality, are a bona fide benefit of meeting the social environmental goal.

For other cases, the science may be so immature that measuring monetary effects would be inappropriate, such as achieving greater biodiversity. In still other cases, it may be impossible to express the benefits in an economic measure, such as maintaining equal access to certain public services for rural residents or bequeathing a healthy resource base to our children. Nevertheless, the effects should be described in the most credible quantitative or qualitative fashion so that policy makers can consider them side-by-side with the monetary benefits.

Some experiments are underway in various states to systematically track this broader list, such as Oregon State University's *Oregon Invests* system (Dutson and Evans). That system, which I worked on in its early stages, brings environmental and other social effects into research reporting along with economic impacts. The Oregon effort is building a comprehensive information base to help research administrators conduct public outreach. It is not an evaluation of the research program. Nonetheless, it is systematically examining the full set of economic, environmental and other social effects of research, and will be applied to extension shortly. The enormous interest in the system around the country likely reflects the need for greater accountability of the full range of research and extension impacts. More work is necessary to validate estimated impacts and to value nonmarket effects.

Rigorously incorporating the full set of research benefits and costs will move us to a criterion of maximizing the social (market and nonmarket) rate of return to federal funds. Using that accountability criterion will add insight into contributions to or detractions from achieving a sustainable agriculture. While much science exists to improve the range and accuracy of estimates of research and education effects, there has been relatively little effort to apply that science. A notable exception comes from the Council on Food, Agricultural and Resource Economics which proposes to bring together the best ideas and develop some standard protocols for research and education performance measurement.

Increased effort at measuring public goods will direct more attention to them in research priority setting (Smith). Under current accounting systems, they are often completely ignored or referred to in vague qualitative fashion because of incomplete data. Setting priorities in a public research system and delivering on them is akin to herding cats. For those not familiar with the herding instincts of cats, it's not an easy job. I speak from experience, having administered research programs within USDA and at a land grant university. The culture of the research process, imbued with images of lone scientists struggling to unlock secrets that will transform society, reinforces researcher autonomy and resists priority setting whether through collective or autocratic processes.

There are advantages and disadvantages to this culture. It has obviously served us well in increasing crop and livestock production. Nonetheless, with the expanding set of criteria for agricultural research and the unrelenting budget pressure likely ruling out increases in funding, more effort at prioritizing seems prudent. The Department is currently conducting an extensive strategic planning process that should yield ideas for what research areas to emphasize and de-emphasize. And they are gathering information from broad groups of stakeholders to learn about the needs of potential customers. Despite these positive steps, it is not clear that all public goods, many that come from sustainable agriculture systems, will be adequately considered in that process because accountability systems have neglected their status. The science exists to do better. The outcomes deserve scrutiny to ensure that a social rate of return criterion is used. The Fund for Rural America has been structured to address many public good issues and could provide insights for the other research and education programs. **Without an improved accountability system, improvements in priority setting and the structure and funding to attack those priorities will be hamstrung.**

RECOMMENDATION ON ACCOUNTABILITY

Congress should require the estimation of physical, biological, economic and social effects of federally-funded agricultural research. Such a requirement would be an essential step in Congress' efforts to improve performance accountability to the taxpayers. The USDA research agencies could lead this initiative, and the National Agricultural Research, Education and Extension Advisory Board could facilitate full stakeholder participation. To ensure its development, however, Congress needs to set aside increased funds specifically for research accountability, establish periodic progress reports, and set firm delivery dates.

Improved Structure and Funding for Public Goods

It goes without saying that public research and education should emphasize activities that provide public goods. To do otherwise invites interference with the private sector that spawns inefficiency, and misses critical social needs that will not be met by private efforts. As alluded to above, public goods have one or two traits that lead to undersupply by the private sector. Either the goods give simultaneous benefits to many people (nonrivalry), or it is technically, economically or socially infeasible to control access to them once provided (nonexclusive). Classic examples are basic knowledge that improves long-term production conditions, food safety and nutrition for all producers and consumers, and clean air. A central goal of sustainable agricultural systems is to provide a wide array of these public goods that carry beyond the farm boundary to rural and urban communities and to future generations.

The public good criterion raises fundamental questions about whether the current research and education system adequately delivers those products and services. As explained in the last section, administrators lack information on their status and value because of poor accounting systems. USDA issues a very useful annual report that tracks changes in natural resource and environmental conditions related to agriculture, but these shifts are due both to private actions and to public programs (USDA, ERS, 1996). Building the accountability system is thus a critical first step.

Research administrators often invoke the maxim "The public sector must do basic science because it provides broad public benefits that the private sector cannot capture." But we know that much applied research and education share those public qualities. The impressive rates of return to public agricultural research that boosted output over the 20th century, much of it applied, support that argument. Now, there are new applied research and education challenges for agriculture. Adapting production management systems in Midwestern states such as Minnesota, Iowa, Illinois, Missouri, Indiana and Iowa to change the quality of water emptying into the Mississippi River/Gulf of Mexico system is an environmental illustration.

There are sound reasons to expect that public research and education programs will neglect natural resource and environmental public goods in agriculture. A major theory of the forces driving R&D argues that innovations are induced to conserve expensive inputs (Hayami and Ruttan). For inputs that have market prices such as land, machinery and labor, the theory tells us that as their prices rise, R&D innovations will emerge to save expense by substituting cheaper inputs or improved management. This incentive to innovate works directly in private R&D and indirectly through user/customer requests for government R&D. We witnessed this process in action when industry rushed to build reduced tillage technology in the late 1970s because it saved energy, labor and machinery expenses. Government and university work followed course. There is sound evidence to support this theory for a number of such land and labor saving technologies.

The induced innovation theory also tells us that "induced innovations" will not effectively conserve natural resource and environmental public goods because they do not have market prices (Ervin and Schmitz). Unless government programs require farmers and ranchers to meet specific environmental performance standards, there is little or no incentive to develop cheaper ways of meeting the targets. Other industries have this incentive for air, water and land pollution regulations, for example, but agriculture has relatively few environmental regulations. The majority of conservation and environmental programs for agriculture use voluntary mechanisms aided by financial assistance. Pesticide regulations are a major exception. Those regulations have induced some new compounds that carry less environmental risk (Osteen and Szmedra). More efficient regulatory schemes accompanied by increased R&D could stimulate further innovations and reduce long-run producer and environmental costs.

Complicating matters even further, the major conservation and environmental programs for agriculture tie financial assistance to approved technologies, such as terraces and land retirement. Such a process essentially picks "technology winners" and does not stimulate innovations that could save public, farmer and environmental costs. This type of government-directed environmental program is at odds with political trends favoring more private initiative. It also runs counter to the latest thinking in environmental management of using market mechanisms to lower short-run and long-term costs of meeting environmental standards. As an example of this thinking, over 2000 economists, including eight Nobel laureates, recently endorsed carbon tax and trading schemes to counter climate change effects. Applying market-based mechanisms to agriculture poses more complexity because of the nature of nonpoint pollution problems, such as diffuse erosion runoff, but the benefits to producers, consumers, the environment and future generations may be large.

What does all of this theorizing imply for agricultural research and technology development? It tells us that we are likely on the wrong R&D path, one that does not provide enough natural resource and environmental public goods or will do so at too high a cost. Only through good luck or foresighted public planning might we expect the current set of production technologies to reflect those public goods values. The significant negative side effects of current technologies suggest that the good luck or accurate planing did not apply. For example, scientific assessments regularly show that agriculture is a large contributor to the nation's water quality impairments.

The absence of values for public goods in the R&D process has likely led to underinvestment in technologies that promote conservation and environmental protection while maintaining production and profit (Ervin and Graffy). Some promising "complementary technologies" have emerged, such as conservation tillage, integrated pest management, soil nutrient testing, organic production, and rotational grazing, but no doubt would have developed at a much faster rate with greater public R&D (OTA, 1995b). I should emphasize that the conclusion holds equally for R&D that would supply positive public goods, such as production systems that increase beneficial insects for pest control, and for R&D that would lessen environmental damages, such as cropping systems that retard polluted runoff. Until the missing values enter the R&D process to guide technology innovation, we will fail to develop pollution prevention systems. Instead, we will be dealing with pollution cleanup, much as has happened recently with manure spills from large livestock confinement operations in North Carolina and Iowa. The likely result is that future environmental compliance costs for agriculture will be higher than need be.

A prime example of missing the full potential to simultaneously deliver production and environmental performance is precision farming. Early research has concluded that precision farming systems have not demonstrated significant environmental gains. This finding should not be surprising. The development and deployment of precision farming technologies has been guided primarily by productivity and profit motives. Companion objectives for improving environmental performance, the performance standards referred to above, are mostly absent. Only if those objectives are integrated into the design of R&D will the full potential of precision farming be realized. This conclusion does not imply that we need to devote a certain amount of agricultural research dollars to precision farming. That would amount to "picking a technology winner" by public R&D support. **We need to make clear the full set of objectives, including environmental performance, that new technologies must satisfy, and delegate the responsibility for R&D to scientists and practitioners in the public and private sectors.**

Do we have any hard evidence to indicate that we have underinvested in these natural resource and environmental public goods? The short answer is no, but we can piece together information that suggests the public research system gives limited attention to the issues.[2] According to 1994 Current Research Information System (CRIS) information, USDA, state agricultural experiment stations and cooperating institutions invested about $373 million annually in the "natural resource" program group out of a total public research budget of about $3.1 billion, or 12 percent. We do not know if expenditures in other research program areas go for natural resource and environmental public goods purposes. **The existing accounting system has not provided reliable data upon which to make credible estimates of the contributions of public agricultural research to environmental and other public goods.** After reviewing available data, Miranowski concludes that current public investment in research contributing to agricultural sustainability is likely underfunded. We can and should develop more inclusive estimates using CRIS data.

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[2] In a study for the International Service for National Agricultural Research, Crosson and Anderson also found relatively small effort on natural resource and environmental issues in a survey of national agricultural research systems (NARS) in less developed countries. They concluded that the capacity of most NARS to address the issues is problematic. To the extent that our agricultural trade prospects and global environmental interests involve those countries, we have a genuine interest in building their capacity through national and international agricultural research.

What about public expenditures for sustainable agriculture research and education programs designed to provide many of these public goods? Congress established the Sustainable Agriculture Research and Education (SARE) Program to address unmet needs in this area. Its $11 million funding is less than 1 percent of federal agricultural research, education and extension budget, but that does not cover work outside SARE that may contribute to sustainable agriculture. One assessment has attempted to categorize all public research projects and resources using criteria from FACTA's sustainable agriculture definition and a rudimentary ranking system (Bird). Federal and state agricultural scientists were asked to rate projects during 1992, 1993, and 1994. Findings showed a very small proportion of the projects, about 5 percent, fell in the sustainable agriculture systems category, and about 30 percent were classified as related to the development of a sustainable agriculture component. A difficulty with this and other rating exercises is how to classify basic research that may or may not directly contribute to sustainable agriculture objectives. Again, the current research accounting system falls short. A separate study investigated how public agricultural research contributed to organic agriculture production systems (OFRF). Their findings showed less than 1 percent of projects made significant contributions to organic agriculture.

Even if precisely categorized, the percent of projects or budget expenditures do not reveal whether we are investing too little or too much in natural resource and environmental public goods. More sophisticated tests are necessary to show if and how much R&D investments respond to shifts in natural resource and environmental values over time. The missing market prices and values on these public goods will complicate such analyses. That does not mean that we should delay doing a better job tracking the natural resource and environmental projects and expenditures, and estimating economic values whenever possible to give the policy makers the best science has to offer. In the end, the research allocation remains a public policy judgment by the Congress.

RECOMMENDATION ON PUBLIC GOODS

I feel the conceptual argument that missing natural resource and environmental prices leads to underinvestment in related R&D is strong. Until more definitive analyses are completed, I think the Congress and Administration should favor more public research and education for these areas. In that vein, it was encouraging to see Congress approve the Fund for Rural America that has a major focus on these questions. Also, the Clinton Administration's recommended 1998 budget increase for natural resource and environmental issues in the National Research Initiative and the increase for integrated pest management are to be applauded. Still, my judgment is that we are investing far short of the optimum. Consider for example that we may spend $20 billion to retire up to 35 million acres of farmland for the next 10 years, nearly 6 times more than for public research on natural resources management if current funding levels hold. Studies of previous land retirement schemes show that virtually all lands return to production after the payments expire. Thus the benefits are short-lived, unlike R&D that develops new integrated systems that sustain profitable production, protect environmental resources, and benefit rural communities. Frankly, until there are incentives to count the benefits of public goods and reward their provision by the public and private research systems, they will not be adequately supplied.

Create a National Commission on Agriculture Extension

Let me turn now to federal policy recommendations to strengthen cooperative extension education, specifically regarding sustainable agriculture. The recent National Research Council report made several recommendations on extension that deserve serious consideration. We believe that a national commission of extension professionals and customers could play a timely and pivotal role in identifying effective strategies to help implement those recommendations and others that will safeguard the sustainability of agriculture. We also think an extension commission would complement the activities of the 21st Century Commission that Congress established in the 1996 farm bill.

Cooperative extension was a full partner with public research in helping U.S. agriculture achieve the dramatic production advances of this century. According to estimates, the extension system has earned returns in the 20+ percent range (Fuglie, et al). One of its principal roles was to accelerate the adoption of new scientific discoveries that would boost production and profit. The rationale was that such public goods should be equally available to all in the farming community.

Like the whole agricultural system, cooperative extension now faces a vastly changed policy world with a broader set of public goods issues. The evolution of those issues has pushed and pulled extension over the past two decades to the point that a central mission is not discernible in many areas. Its relationship with research has become strained in many states. That is most unfortunate because we feel that the extension system has enormous potential to assist U.S. agriculture in meeting the goals of a sustainable agriculture that Congress laid out in FACTA, and the Secretary has recently endorsed.

For years now, we and other like-minded organizations have felt that extension, as an organization, was reluctant to help farmers understand and adopt potentially sustainable approaches. The unpopularity of the concept in the conventional agriculture community was too powerful a force for extension to ignore. We supported the addition of Chapter 3 of the SARE program in the 1990 farm bill as a way to stimulate extension interest and the ability to teach sustainable agriculture. Chapter 3 has had a positive impact, even though it may look a little like a "stick" added belatedly to provisions supporting sustainable agriculture research.

Our thinking has changed in the past year. The reason is that we are hearing about, and seeing, extension agents who are genuinely interested in the sustainability of agriculture, who are hard at work learning how to teach it, and who are making a difference. We have met dedicated agents and, yes, extension administrators who want to understand the unforeseen, adverse side effects of conventional farming and how to help farmers wisely consider alternatives. They do not worry about being criticized by traditionalists. They are taking risks.

Therefore, we think it's time to stop scolding extension for dragging its feet and to reward those agents and their leaders who demonstrate the kind of curiosity and commitment that will help American agriculture move down a more sustainable path.

There are hundreds of examples around the country but let me cite a couple from Oregon that I am familiar with. Clark Seavert and colleagues have developed an innovative program titled "Integrated Fruit Production" to help fruit growers reduce pesticide use (Seavert, et al.). It's too soon to tell how successful the program will be, but one early finding is a dramatic improvement in biological control impacts. John Luna at Oregon State University is collaborating with colleagues to hold a cover crops workshop to help producers learn of their soil improvement, water quality, and pest management benefits. Both activities are proceeding upon two principles of good sustainable agriculture extension programming -- integration of extension and research professionals and collaborative partnerships with farmers and ranchers.

We think it is an opportune time to create a national commission that explores innovative solutions to the contemporary issues affecting extension, with heavy emphasis on sustainable agriculture. The Smith-Lever Act of 1914, which established extension, was the product of such a serious undertaking. Established by President Theodore Roosevelt, it was called the Country Life Commission. It recommended that "Each state college of agriculture should be empowered to organize as soon as practicable a complete department of college extension, so managed as to reach every person on the land in its State, with both information and inspiration.... It should be designed to forward not only the business of agriculture, but sanitation, education, home making, and all interests of country life" (see Rasmussen). The time has come for an undertaking of comparable boldness and depth to plot a course for sustainable agriculture extension in the next century.

RECOMMENDATION ON EXTENSION

We recommend establishing a national commission on agriculture extension to help discover strategies for safeguarding the sustainability of U.S. agriculture. We need to stop and look carefully at where extension has come from, where it is now, and where it can go. Exciting institutional and programming changes are being tried in several states. The commission we recommend should look there for promising ideas and insights. Although a primary focus of its inquiry should be extension programs for sustainable agriculture, it is likely that the commission would have much to say about the future of the extension system as a whole.

MASSACHUSETTS FORESTRY ASSOCIATION
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August 20, 1997

Mr. Larry Combest
Mr. Cal Dooley
Subcommittee on Forestry, Resource Conservation & Research
Committee on Agriculture
U.S. House of Representatives
Room 1301, Longworth House Office Building
Washington, D.C. 20515

RE: Forest Inventory & Analysis Cycle in the Northeast

Dear Mr. Combest & Mr. Dooley:

The Massachusetts Forestry Association is a non-profit woodland owners association which encourages the conservation and stewardship of forest lands in Massachusetts. Proper stewardship is dependent upon adequate information about growth rates, species volumes, mortality and other data which is collected by the federal Forest Inventory & Analysis. Only the FIA information addresses these topics for private woodlands and in Massachusetts small, privately-owned woodlands make up 85 percent of the 3 million acres of forest. Without such data, policy decisions are not being made based on facts, but rather on assumptions.

Not only is adequate data essential but it is also essential that it be collected and analyzed often. Making decisions on the basis of data which is 12 or more years old is an exercise in futility in a rapidly-changing world, but given the current cycle for FIA data, that's what foresters and policy makers here are asked to do. FIA data is needed for many purposes: industry location, forest policy planning, conservation and habitat planning, energy facility siting, and watershed protection. More than one significant forest industry expansion planned for Massachusetts has been put on hold because of the lack of recent data on the availability and types of timber which would supply the facility.

We urge that the research title be changed to permit FIA cycles be shortened to five years for the Northeastern states and the nation. Better and more timely data collection and distribution will permit better decisions to be made concerning our forests.

Sincerely,

Greg Cox
Gregory Cox
Executive Director

/gac

cc: Massachusetts Congressional Delegation

Founded in 1970 as the Massachusetts Land League
Dedicated to the Conservation and Stewardship of Massachusetts Trees and Forests

STATE OF NEW HAMPSHIRE
DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT
DIVISION of FORESTS and LANDS
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Commissioner

PHILIP A. BRYCE
Director

August 22, 1997

Mr. Larry Combest
Mr. Cal Dooley
Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
United States House of Representatives
Room 1301, Longworth House Office Building
Washington, DC 20515

RE: Farm Bill Research Title

Dear Mr. Combest and Mr. Dooley:

The federal government provides a great service to New Hampshire through the Forest Inventory and Analysis (FIA) conducted by the US Forest Service. The 1983 FIA data is the information about our forest resources that is the foundation for forest policy decision making by public and private entities alike. Therein lies the problem.

Information about our forests that is 13 years old, or more, is inadequate to address the challenges we are facing today. The prospects of not receiving this data again for another 13 or more years is frightening.

The State of New Hampshire recently completed its legislatively mandated comprehensive statewide Forest Resources Plan. A key finding follows here:

> "...there is insufficient information on some issues vital to sustaining our forests. In some cases, the information is not being collected. In others, the system for collecting data is not thorough or timely. New Hampshire depends upon the U.S. Forest Service decennial Forest Inventory and Analysis (FIA) for data on the status of timber and other forest resources. However, FIA inventories are conducted at unpredictable intervals..."

The report on Re-engineering NEFIA by the Northeastern Area Association of State Foresters sets as its first priority: "Move to a 10 year maximum inventory cycle. The NEFIA cycle is currently about 13 years. This is deemed unacceptably long by most users concerned about relevance of old data." Also, I stated to your full committee earlier this year, "Provide more complete and timely data through the US Forest Service Forest Inventory and Analysis so that States can make informed decisions about their resources."

Thank you for the opportunity to provide input. Please let me know if I can be of further assistance. A shortened FIA cycle is critical to assessing the degree to which we are managing our forests sustainably.

Sincerely yours,

Philip A. Bryce
Director

PAB/arr
cc: Representative Charles Bass
Representative John Sununu

August 22, 1997

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Mr. Larry Combest & Mr. Cal Dooley
Subcommittee on Forestry, Resource Conservation and Research
Committee on Agriculture
U.S. House of Representatives
Room 1301, Longworth House Office Building
Washington, DC 20515

Dear Messrs. Combest & Dooley:

I am writing to urge you and the House Committee on Agriculture to place the Forest Inventory & Analysis (FIA) on a five-year cycle in each of its regions. I understand that the upcoming revision of the research title of the Farm Bill will offer an opportunity to do this.

Historically, what was intended to be a decennial survey has failed to meet the ten-year goal in New England. Those of us in northern New England who depend upon these data are working in a fast-moving forest resource utilization and policy environment. Our current information is from 1983, and we can expect reports from the next cycle no earlier than next year. In the interim, (we think) we have seen numerous fiber-using business expansions and huge tracts of land withdrawn from timber production. In the first half of this decade, Congress spent over $4 million developing the Northern Forest Lands, forest resources policy report, "Finding Common Ground." Forest "sustainability" is one of the most-frequently cited concepts when natural resources policy is being developed. Yet, we have had no funding to update the factual base for monitoring sustainability.

In the Northeast, where the urban population and the forest products industry interface so heavily, it is crucial that we have accurate information on a reliable and frequent cycle, so that the public and business can monitor and adjust our policies and decisions, accurately and in a timely fashion. FIA data are necessary for forest planning, policy decisions, industry location, expansion and planning, and government and private conservation planning.

Please support the FIA on a five-year cycle throughout the country. It is the best tool available for rational forest resource planning, and the Federal Government is uniquely capable of providing this service.

Thank you.

Yours truly,

Bradford Wyman

A. Bradford Wyman
Manager, Wood Department

cc: Hon. Charles Bass
Hon. John E. Sununu, Jr.
Katie Cutler
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